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AMERICAN ANTIQUITY

VOL. XIX APRIL, 1954 NO. 4

CULTURAL AND NATURAL AREAS BEFORE KROEBER

GEORGE I. QUIMBY

KROEBER'S CLASSIC STUDY of the "Cultural and Natural Areas of Native North America" has been invaluable to ethnologists and archaeologists working with cultural phenomena more recent than the beginning of the Christian era. However, it has become increasingly evident that the cultural and natural areas of the neo-Indian (the term used by Griffin, 1946, p. 38) were not necessarily those of the paleo-Indian (the term used by Roberts, 1940, pp. 51-116). It is therefore my intent here to outline briefly, and without much detail, the cultural and natural areas of the paleo-Indian.

I have focused my attention upon glaciation, because the presence of a continental glacier seems to have been a major factor of North American paleogeography in the periods here considered. Climate, which possibly is more the result of, than the cause of, glaciation, I have interpreted in terms of pollen levels, and any other phenomena that I could understand. I have assumed that the radiocarbon dates are essentially correct, and have used them for temporal correlations as well as for the actual dating of events. All of the data used in the preparation of the maps are in the appendix. What follows should be considered a series of hypotheses.

MANKATO AND VALDERS ADVANCES

Radiocarbon dated events suggest that the Mankato ice advanced about 12000 or 11000 B.C., and had retreated before the Valders advance about 9000 B.C. (Figs. 81, 82, and Appendix). Analysis of ocean bottom sediments dated by the "per cent of equilibrium" method indicate an abnormally cool world climate from about 11000 B.C. to about 5000 B.C. (Hough, 1953a, p. 257). In North America, however, the retreat of the Valders ice and the northward progression of the pine period in the east suggests that by 7000 B.C. or even earlier, the climate was becoming warmer.

In the period from 12000 B.C. to 7000 B.C. all of North America north of Mexico may have been one great natural area in the sense of the term as used by Kroeber (1939, p. 60). The climate was cool and relatively moist. With the exception of the glacial ice and probably the Rocky Mountains, there were no natural barriers to limit or confine the spread of the paleo-Indians. Everywhere, beneath the timber line, there were forests or rich grasslands. Along most of the glacial front there were forests of spruce and fir. Deserts were probably lacking completely, and large lakes were abundant. Among the native animals of importance to the paleo-Indians were elephants, mastodons, horses, bison, camels, and sloths.

In this period there seem to have been two major culture areas, the paleowestern area west of the Rocky Mountains and a paleoeastern area, largely east of the Rockies, but interpenetrating the paleowestern area in what is now the Southwest (cf. Jennings, 1953, pp. 204-5).

Paleowestern cultures in radiocarbon dated contexts have been manifested at Danger Cave, Utah, about 9300 B.C. (Jennings, 1953, p. 185); Leonard Rockshelter, Nevada, about 9200 B.C. (Heizer, 1951, pp. 95-6); Gypsum Cave, Nevada, about 8500 B.C. (Libby and Arnold, 1951, p. 8); and Fort Rock Cave, Oregon, about 7100 B.C. (Libby and Arnold, 1951, p. 12).

Paleoeastern cultures in radiocarbon dated contexts are Folsom dated at about 8000 B.C. and Clovis (Llano) which is stratigraphically older, and therefore earlier than 8000 B.C. (Sellards, 1952, p. 117). Clovis (Llano) was associated with an elephant-hunting economy in the grasslands (Sellards, 1952, pp. 17-42) and possibly also in the forested areas farther east. Ancient sites producing Clovis points have now been reported in New England and the middle Atlantic seaboard (Byers, 1954). The later, Folsom culture, seems to have been widely distributed throughout the paleoeastern area and is found in the southern part of the paleowestern area. In the grasslands of the

paleoeastern area the Folsom points have been associated with the hunting of an ancient type of bison and other grazing animals (cf. Sellards, 1952, pp. 47-60). Elephants and mastodons seem to have become scarce or unpopular in the grasslands by 8000 B.C., but probably persisted longer in the wooded areas adjacent to the grasslands.

The Anathermal Period

The Anathermal period (Antevs, 1948) was a period of increasing warmth, lasting from about 7000 B.C. to 4500 B.C. Although the dated cores of ocean floor sediments suggest an abnormally cool period lasting until about 5000 B.C. (Hough, 1953, p. 257), the northward progression of pine in the east, the fairly rapid retreat of the glacial ice, and knowledge of subsequent events suggest a climate that was becoming increasingly warmer and drier (see Appendix and Figs. 83 and 84).

In this period, about 7000 B.C. to 4500 B.C., all of North America north of Mexico may have been one great natural area or there may have been two or more. But there still seem to be only two culture areas, paleowestern and paleoeastern. On the assumption that the differentiation of culture areas was in part the result of environmental differences, I shall treat the two divisions as both cultural and natural areas. The paleowestern area still had many large lakes. In the northern part of the area there were forests of pines (Hansen, 1947, pp. 114-15) and sagebrush was present in Oregon about 7000 B.C. In the southern part of the paleowestern area in what is now Arizona hickory was present at about 5800 B.C. The paleowestern cultures were based upon hunting and seed gathering economies. Blade and point shapes plus the presence of seed grinding implements imply ". . . a basic pattern of life that was once ubiquitous between the Rockies and the west coast." (Jennings, 1953, p. 205).

Paleoeastern culture of this period was based upon a hunting economy. In the grasslands the "Yuma" culture bearers and somewhat similar, if not related, groups hunted the bison and other grazing animals (cf. Roberts, 1951, p. 21). Radiocarbon dates bracket these cultures in a time extending from somewhat earlier than 7000 B.C. to somewhat after 5000 B.C. Although no radiocarbon dated finds of Anathermal period cultures as yet exist for the eastern forests the broad distribution of the same kinds of artifacts that were found in the grasslands, suggests a coeval forest zone occupancy. That such an occupancy may have lasted later in the forests is a possibility better understood in the frame of reference of the Altithermal period.

The Altithermal Period

The Altithermal period (Antevs, 1948) was exceptionally warm. It lasted from about 4500 B.C. to about 2000 B.C. (see Appendix and Figs. 85, 86 and 87). In much of the west it was exceptionally dry. The east was somewhat moister. This long period of warmth and relative dryness was responsible for the creation of the natural areas described by Kroeber (1939). However, in the Altithermal the characteristics of the areas existed in more extreme forms than they did in the following period.

The high plains, formerly a rich grassland, became probably a desert and certainly a marginal area. The grasslands, like the people, moved eastward or westward, or disappeared. At this time grass reached its maximum in the northwest (Hansen, 1947, pp. 114-15) and prairies extended across the state of Ohio (Sears, 1932, p. 621). In the eastern woodland areas the deciduous forests made their northernmost advance. In the Great Basin the lakes dried up and what had once been a rich area became relatively marginal, although the plateau area to the north seems to have been fairly well off. The southwest too became arid and marginal. From a cultural point of view the only paleo-Indian climax of the Altithermal takes place in the eastern forest regions. The eastern woodlands were somewhat different in Altithermal times. The coniferous forest zone was farther north and probably formed a segment of the circumboreal zone extending northwestward through Alaska and across Siberia, Russia, Finland, Sweden, and Norway. The deciduous forests also had spread northward. In the northern part of the eastern prairie and forest zones there were tremendous glacial and nonglacial lakes. In the northern parts of the Huron and Superior basins paleo-Indians lived on the lake shores within fifty miles or so of the continental glacier (Greenman and Stanley, 1943; MacNeish, 1952). In New York state the Lamoka Indians (3500 B.C. and perhaps earlier, Ritchie, 1952) probably lived just south of a glacial sea. In the same region, the Laurentian peoples (3000 B.C. to

1000 B.C., Ritchie, 1952) lived in the deciduous forest along the shrinking Ottawa Sea, a transgression of the St. Lawrence lowland and the Ontario basin by the ocean. Both Lamoka and Laurentian may represent the arrival of circumboreal people who followed the pancontinental coniferous zone leading from Asia to the eastern United States (cf. Linton, 1951, p. 315). Although Lamoka and Laurentian were forest-adapted, they may have kept to the forests of the New World only because the plains were so uninviting during the Altithermal. Throughout the eastern forests there were paleo-Indian cultures radiocarbon dated from before 3500 B.C. to 1000 B.C. Culture traits heretofore not present were the use of the domesticated dog, use and manufacture of copper tools, and a number of ground stone tools such as axes, adzes, gouges, and bannerstones.

In summary, the following cultural and/or natural areas prevailed in the Altithermal period: the eastern Woodlands relatively moist and pleasantly habitable, the arid Plains, a dry Southwest, a dry Great Basin, and a relatively dry Plateau with lakes still in existence. During the Altithermal the icecap had retreated rapidly toward Hudson's Bay, but between 2000 B.C. and 1000 B.C. it advanced again (the Cochrane advance) and the ensuing change in climate terminated the Altithermal.

THE MEDITHERMAL PERIOD

The Medithermal period (Antevs, 1948), was relatively cool and moist compared to the Altithermal. It probably began before 1000 B.C. Abnormally cool periods centered at 1250 B.C. and 850 B.C. have been recorded by ocean bottom sediments (Hough, 1953, p. 257). Moreover, the advance of the icecap representing the Cochrane stage took place about this time (see Appendix and Figs. 87 and 88). Although the effects of the Altithermal period may have lingered a bit in various spots, the Medithermal saw the development of essentially the natural areas described by Kroeber (1939). Moreover, there were neo-Indian developments in the early parts of the Medithermal that established or foreshadowed many of the culture types comprehended by Kroeber. It seems reasonable to expect that someone with the proper background and interests could make a detailed analysis of cultural and natural areas during paleo-Indian times in much the same way Kroeber approached the problem for late neo-Indian times.

This preliminary study has led to some random thoughts or agreement with the random thoughts of others. Some of these are as follows. The paleowest was a unique culture area and probably represents the kind of culture platform that was ancestral to developments in Nuclear America. Entrance to the paleowest may have been through the "Rocky Mountain Trench" rather than through the corridor east of the Rockies. Because of radical changes in environment this region offers opportunity to look for culture process through archaeological research into the long cultural continuum in the area.

The paleoeastern area may have had its earliest climax in the grasslands of its western portion. When the Altithermal made these grasslands marginal, there was a cultural climax in the eastern forests. Entrance into the paleoeast throughout its history seems to have been via the corridor east of the Rockies. The presence of glacial lakes, other bodies of water, and ice must have influenced avenues of eastward spread within the forest zone. For instance, unless they traveled by boat, the Lamoka peoples must have gone south of the Great Lakes to reach New York state.

APPENDIX

This appendix is intended to show the basis and bias of each of the maps. It should also show that I bit off more than I could chew. What it may not show, but should, is that geologists are just as confused and confusing as archaeologists.

WISCONSIN GLACIATION AT THE TIME OF THE VALDERS CLIMAX: 9000 B.C.

Figure 81 shows North America at about the time of the Valders climax in the period of latter Wisconsin glaciation. This map is based on data from Flint, *et al.* (1945), Antevs (1929), Bretz (1943, 1951), Bird (1953), Leverett and Taylor (1915), Johnston (1933), Thwaites (1937), Townsend and Jenke (1951), and various radiocarbon dated events.

The position of the Valders ice front seems generally well known in the Great Lakes area, but less so elsewhere. It seems likely that the Laurentide ice sheet of Valders times was considerably smaller than its predecessors. Moreover, by using only such criteria as identified moraines and beaches, lake beds, outlets of glacial lakes ponded by the ice front at given

identified stages of retreat or advance, and various events dated by radiocarbon means, the only maximum position of the Valders ice front need be as placed tentatively on Figure 81.

The Mankato moraine and the Des Moines lobe seem to be earlier than the Valders climax, and earlier than the end of the Two Creeks interval as registered in Wisconsin. Evidence in support of this belief consists of the radiocarbon dates of old wood from glacial deposits on Skunk River, Iowa (samples C-664, C-653, C-596, Libby 1952, p. 3) and a date on a piece of wood buried in the sediments of Lake Agassiz in the vicinity of Moorehead, Minnesota (sample C-497, Libby and Arnold, 1951, p. 7). The Skunk River dates, 12090 B.C., 10248 and 10000 B.C. suggest that the Des Moines lobe is probably a thousand years earlier than the end of the Two Creeks interval in Wisconsin, dated by radiocarbon at about 9453 B.C. (Libby and Arnold, 1951, pp. 7, 8; samples C-308, 365, 366, 536, 537), and is therefore at least a thousand years earlier than the Valders climax.

The wood seems to suggest a warm interval preceding the Mankato ice advance. Dated deposits near Fairbanks, Alaska, that would seem to lend support to this idea have radiocarbon dates of 11648 B.C. (Kulp, Tryon, Eckelman, and Snell, 1952, p. 412, sample L 117I) and 10671 B.C. (Libby and Arnold, 1951, p. 9, sample C 301). The Lake Agassiz date of about 9232 B.C. suggests that some early stage of that lake would correlate with the Two Creeks interval and the advance of the Valders ice.

In mapping the Laurentide ice sheet in the west I have followed a popular geological consensus that the Altamont moraine is a correlative of the Mankato and probably also of the Max moraine described by Townsend and Jenke (1951). The ice front manifested by these moraines would appear to antedate the Two Creeks interval.

There do not seem to be any known geological events that would necessitate the conclusion that the corridor between the Cordilleran and Laurentide ice sheets was closed at any time during and after the Mankato maximum (cf. Bretz, 1943). However, this corridor does appear to have been closed during the maximum of Wisconsin glaciation (Antevs, 1929; Flint, *et al.*, 1945). It was certainly open during the Valders climax.

The northern limits of the Mankato maximum are entirely unknown (Flint, *et al.*, 1945) and also the northern limit of Valders. But there seems not to be any necessary reason for extending Valders limits farther northward than has been done on Figure 81. The movements of centers of radial flow in the period of latter Wisconsin glaciation, in reality a period of deglaciation, "combine to give a consistent general picture of a reduced Laurentide ice sheet shrinking toward a central area in the Hudson Bay region" (Flint, 1943, p. 358; see also Bird, 1953, p. 228). In fact as subsequent maps will show, the only sensible way I can get rid of the ice sheet is to have it shrink into the middle of Hudson's Bay. With a concept of the Laurentide ice sheet shrinking toward Hudson's Bay, it seems reasonable to expect a southward retreat of the northern front of the Laurentide ice sheet. Such a situation once existed in northern Europe when the shrinking icecap exposed the northern coasts of Norway at about the same time that it exposed the southern coasts. Moreover, a southern retreat of the northern front of the icecap would seem reasonable, because, as Daly (1934, p. 81) emphasizes, the continental icecaps are not polar. Mindful of these considerations and in lieu of concrete evidence, I have somewhat arbitrarily placed the northern boundary of the icecap as shown in Figure 81. About all one

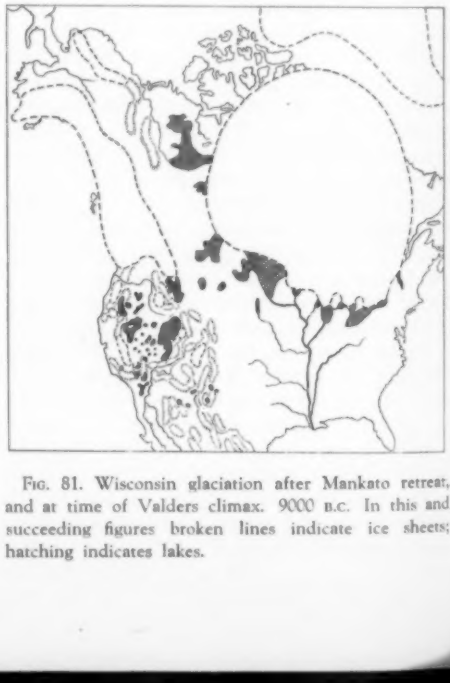

FIG. 81. Wisconsin glaciation after Mankato retreat, and at time of Valders climax. 9000 B.C. In this and succeeding figures broken lines indicate ice sheets; hatching indicates lakes.

can say with certainty is that the shrinking Laurentide icecap of the Valders stage had to have a northern boundary and that there is no compelling reason for placing the northern limit very far north.

In Valders times and earlier there probably was a land bridge between Alaska and Siberia at Bering Straits. For instance, Smith (1937, p. 89) states, ". . . from specific soundings recorded on the Coast Survey charts it would appear possible that a course could be laid out between the two continents where depths of water not to exceed 20 fathoms (120 feet) might be found." Moreover, Daly (1934) restated by Smith (1937, p. 89-90) guessed that the amount of water taken "from the oceans to build the ice sheets of the latest Pleistocene stage would have lowered the ocean level . . . approximately 280 feet." Furthermore, Daly (1934, p. 101, table XVII) guesses that the ice sheet had lost 50 per cent of its volume by the time of the beginning of Lake Algonquin (see Fig. 83). I would take this to mean that the melting ice, half gone at this time, would have increased the ocean level by 140 feet, but that the level was still 140 feet lower than the present, other factors being constant. If these guesses are anywhere near correct, there would have been a land bridge in the Bering Straits region from before Mankato times until perhaps the time of Lake Algonquin. This land bridge probably was larger than appears on the Figures 81, 82, 83. And after the time of Lake Algonquin the Bering Straits region must have been different than now — perhaps narrower with more islands.

The glacial features of the far west and northwest do not seem to be clearly delineated for Valders times. The extent of the Cordilleran glaciation in Valders times or even its very presence seems to be unproved (Flint, *et al.*, 1945). Figure 81 pictures what may be a Cordilleran maximum of the pre-Valders or even pre-Mankato stage. It could well be that the plateau was free of ice and that only piedmont and valley glaciers existed in the mountain regions proper. Probably the Rocky Mountain Trench, a persistent steep-sided valley stretching some 1,100 miles through the plateau from Flathead Lake, Montana, across British Columbia to the Liard River Valley of Yukon territory (Robinson, 1953, p. 37) was free of ice. In any event there seem to be no concrete data that would require one to postulate a larger Cordilleran glaciation than is indicated on Figure 81 in Valders times and it probably was much smaller. The same situation obtains with reference to the mountain glaciers of the far west. It seems possible that there were mountain glaciers present in Valders times, but there seems to be no demonstrable proof of this (Flint *et al.*, 1945).

In assessing the lakes of the Intermountain areas I have used the *Glacial Map of North America* (Flint *et al.*, 1945) which shows the maximum extent of these lakes. And since one of my arbitrary assumptions in this paper is that the radiocarbon dates of geological events are essentially correct, I must follow Allison (1953, pp. 237-8) instead of Antevs (1953, p. 237) and correlate the 100 foot level of later Lake Stansbury with Valders. Moreover, I must also follow Heizer (1951, p. 95, note 2) in correlating the Lake Lahontan beach gravels (4175 feet above sea level) at the Leonard rockshelter with the 100 foot level of Lake Stansbury and with Valders. Having done this, and further assuming that the other lakes of the Great Basin shared the same general trends, I would conclude that the Basin lakes were still of considerable extent in Valders times, but much smaller than they had been at their maxima in pre-Valders and even pre-Mankato times. Thus the Intermountain lakes shown in Figure 81 should probably be smaller in area, but the significant fact is that they existed as lakes much larger than any natural lakes in the region today.

Of the vegetation in Mankato times there is little that can be stated with certainty. The forest knocked down by the advancing Valders glacier consisted of spruce trees (Flint and Deevey, 1951, p. 262), pine, oak, ash, linden, cedar, and tamarack (Flint, 1947, p. 251). During the last few years of the lives of spruce trees and perhaps others there had been a decrease in rate of growth, but otherwise the advancing ice seems to have had little effect upon the trees until the actual pushing over and breakage occurred.

North American pollen studies generally reveal spruce-fir as the earliest postglacial cover in the region of the southern front of the Laurentide ice. Deevey, however, has demonstrated an early tundra zone in northern Maine (Deevey, 1951, pp. 177-207) that preceded the establishment of the forest.

On the basis of little evidence and some realization of the complications of pollen analysis and interpretation, and at the risk of oversimplification I would follow Sears (1942) and place a spruce-fir forest along the glacial front in the Great Lakes region and follow Deevey (1951) and place tundra and birch woods in northern New England. This probably would have occurred at the time of the Valders advance and maximum or even earlier, a time at which, according to the interpretation of this paper, New England probably received little if any of the Laurentide ice, but nevertheless had an unusually cold climate in the highlands. Such an interpretation receives some support from the pollen stratigraphy in Maine and the radium dating of varved clays in Connecticut (Flint and Deevey, 1951, p. 272). I would further postulate some tundra and birch woods in the open corridor between Alaska and the plains. The presence of a spruce-fir forest south of the ice would entail pushing the pine zone and the hardwood forests farther south than at present. The plains probably contained some forested areas but in general were essentially fertile grasslands and the Intermountain area probably was largely forested. Both areas certainly had plenty of water. In the north, what is now arctic and subarctic, there must have been glacial lakes of tremendous size. The lake outlines shown on Figure 81 are largely imaginary, but indicate the order of magnitude of the bodies of water suggested by present drainage patterns and the former presence of an ice sheet. A succession of northern lakes ponded on the east by ice would have extended southward toward an early stage of Lake Agassiz which seemingly would be of considerable size at this time. Lakes Regina, Souris, and Dakota (cf. Flint, 1947, Fig. 56) were certainly not later than the time of the Valders maximum, but may have been earlier.

In the absence of radiocarbon dates for specific stages of glacial Lake Agassiz it is difficult to make correlations with the lake stages of the Great Lakes basins. One clue, however, lies in the assumption of eastward drainage of Agassiz toward the Lake Superior basin. Such drainage is assumed to have taken place after the successive establishment of the Herman, Norcross, and Tintah beaches and to have been terminated by an ice advance that blocked this drainage (Leverett and Sardeson, 1932). It is tempting to suggest that the Valders advance was the blocking agent, in which case, the eastward drainage of Agassiz could have been into the Lake Superior basin during the low water stage of the Two Creeks interval (cf. Hough, 1953, pp. 46, 51). But it seems equally plausible, in this context, that this first eastward drainage of Lake Agassiz was to the Superior basin at the time of glacial Lake Duluth and was terminated by a local oscillation of the ice front. If either event ever actually happened, it is possible to date the Tintah beach stage as prior to the event and the fourth or Campbell beach stage as subsequent to the event. Translated into radiocarbon terms the two possible earliest dates are about 9000 B.C. and 7000 B.C. — dates respectively of the Valders climax and the Toleston beach of Lake Chicago at the approximate time of Lake Duluth. Later dates do not seem probable as two stages later than Campbell seemingly can be correlated with later events.

The glacial great lakes of the period of the Valders climax are based upon the works of Leverett and Taylor (1915), Antevs (1939), Bretz (1951), Fairchild (1909), Stanley (1936, 1937, 1941), and Hough (1953).

Wisconsin Glaciation at the Time of the Valders Retreat and Lakes Chicago and Warren: 8500 B.C. to 7000 B.C.

Figure 82 shows the latter Wisconsin glaciation at the time of the Valders retreat and Lakes Chicago and Warren (cf. Hough, 1953, Fig. 21; Leverett and Taylor, 1915, plate XVII). This period can be dated approximately in the following way: A piece of wood found in the varved clays at the bottom of glacial Lake Oshkosh (Libby, 1952, pp. 6-7) gave a radiocarbon date of 8724 B.C. This wood probably was deposited as driftwood in Lake Oshkosh and therefore would provide a date early in the retreat of the Valders ice. At this time the eastern pine forest extended at least as far north as West Virginia where it was radiocarbon dated at about 7500 B.C. (Libby and Arnold, 1951, p. 10). Presumably a spruce forest zone lay between the ice front and the pine. The plains seem to have been rich grasslands that supported numbers of the bison, horse, and camel families as well as other grazing animals hunted by paleo-Indians with

spears tipped with Folsom fluted points. Somewhat earlier, at least before 8000 B.C. (cf. Roberts, 1951, p. 20) the paleo-Indians of the plains were hunting members of the elephant family, which seem to have disappeared from the plains by 8000 B.C., but not necessarily from other areas.

The paleo-Intermountain region must still have contained many lakes, some of them exceedingly large by present day standards. The Cordilleran glacier, which was considered to have been relatively weak in Valders time must have been considerably reduced, if present at all.

Wisconsin Glaciation at the Time of Glacial Lakes Duluth, Chicago, and Lundy: 7000 or 6500 B.C. to perhaps 5500 B.C.

Figure 83 shows North America at the time of glacial Lakes Duluth, Chicago, and Lundy during the period of latter Wisconsin glaciation. Perhaps deglaciation would be a better term as the Laurentide ice is shrinking. The ice front in the region of the Great Lakes is based on data from Leverett and Taylor (1915, Plate XIX) and Hough (1953, pp. 37-68, Fig. 22). The glacial border outside of the Great Lakes is tentative, but based upon an unknown amount of shrinkage from the position shown in Figure 81, the data for which have already been presented. Wood presumably associated with the Toleston strand level of glacial Lake Chicago provided a radiocarbon date of about 7250 B.C. (Libby, 1952, p. 6, sample C 674). This stage of Lake Chicago should correlate with glacial Lakes Lundy and Duluth. There is also a radiocarbon date of 6562 B.C. for wood from Lake Lundy deposits at Bellevue, Ohio (sample C 526, Libby and Arnold, 1951, p. 16). The climate was warmer than previously, for the pine forests seem to have been spreading northward. The pine zone in Connecticut was established at least by 6800 B.C. (Flint and Deevey, 1951, p. 296, note 2) and was present in 6400 B.C. (Flint and Deevey, 1951, p. 271). In southern Minnesota, the pine forest was in evidence by about 6000 B.C. (Flint and Deevey, 1951, p. 272).

In the paleo-plains area there were Indians who lived by the hunting of principally bison. A Nebraska site of bison hunting Indians has a radiocarbon date of about 6300 B.C. (Roberts, 1951, p. 21 and footnote) and a South Dakota site is radiocarbon dated at 5800 B.C. (Roberts, 1951, p. 21). The nature of these old sites and the fauna present imply a grasslands environment.

The paleo-Intermountain area seems to have provided a favorable environment at this time. The lakes were getting smaller, but probably

FIG. 82. Wisconsin glaciation at the time of the Valders retreat; lakes Chicago and Warren are shown. 8500 B.C. to 7000 B.C.

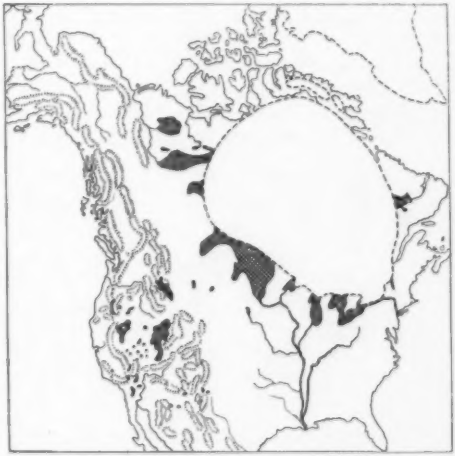

FIG. 83. Wisconsin glaciation at the time of glacial lakes Duluth, Chicago and Lundy. 7000 B.C. to 5500 B.C.

did not dry up or reach their minimum size until some time during the Altithermal period. Some sandals from Fort Rock Cave site in Oregon, dated at about 7000 B.C., were made of the fibre of sagebrush (Flint and Deevey, 1951, p. 278), a probable indicator of relative aridity. Thus the region was already relatively dry or becoming so at this time.

Wisconsin Glaciation at the Time of Lake Algonquin: 5500 B.C. to 4500 B.C.

Figure 84 shows the Wisconsin glaciation at the time of Lake Algonquin. Following Lake Lundy and Lake Chicago at the Toleston level came the stage known as Lake Algonquin which existed in the basins of Lake Michigan and Lake Huron, but not in the Superior basin (Hough, 1953, pp. 57-67). At this time a late stage of glacial Lake Duluth occupied the western part of the Superior basin which otherwise was ice covered (Hough, 1953, pp. 63-6). The ice front extended southeastward covering the northern borders of Georgian Bay (cf. Stanley, 1943) and ice dammed the Kirkfield outlet (Hough, 1953, p. 67) east of southern Georgian Bay. When this ice dam melted Lake Algonquin was terminated and the transition to Lakes Chippewa and Stanley was begun.

This concept of Lake Algonquin, taken from Hough (1953) is quite different from the older concept of Leverett and Taylor (1915, pp. 407-46), and is based primarily on data collected and interpreted by Stanley and Hough. There is only one stage of Lake Algonquin and it corresponds in part to what Leverett and Taylor called highest Algonquin. Lake Algonquin, being later than Lakes Chicago and Lundy, must be later than 6500 B.C. Lake Algonquin is earlier than Lakes Chippewa and Stanley which may date from 3500 B.C., but which are preceded by a transition stage of unknown duration. I would therefore place the Algonquin stage at about 5500 B.C. to 4500 B.C. until more exact dating is possible. Evidence of relatively warm climate is shown by the presence of pine forests in southern Minnesota by about 6000 B.C. and in northern Minnesota by about 5000 B.C. (Flint and Deevey, 1951, p. 272). There was pine forest in southern New England at 6000 B.C. and later (Flint and Deevey, 1951, p. 271).

In the plains the presence of paleo-Indian hunters dependent upon bison and other grazing animals suggests grasslands and somewhat moister conditions than prevailed subsequently in the Altithermal period. Sites of such paleo-Indian hunters have been radiocarbon dated as late as about 5000 B.C. in Wyoming and South Dakota (Libby and Arnold, 1951, p. 18).

The paleo-Intermountain area seems to have been quite habitable at this time. In its southern part in Arizona for example, the Sulphur Spring stage of the Cochise culture, radiocarbon dated at about 5800 B.C. and 4250 B.C., was associated with hickory forest and lakes in an area that later became a desert. In Nevada the Humboldt cultures persist to at least about 5000 B.C. (Heizer, 1951, p. 96). It seems probable that at this time the climate was getting warmer, possibly already in the initial phases of the Altithermal. However, it seems apparent that the climax of the Altithermal was not reached until much later.

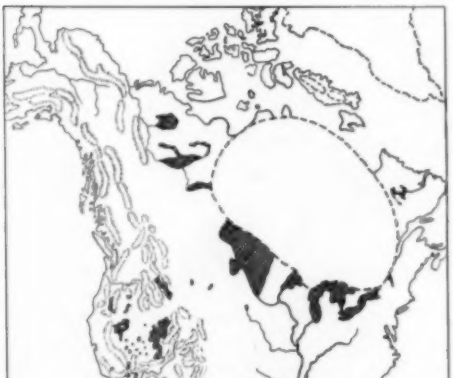

Fig. 84. Wisconsin glaciation at the time of glacial Lake Algonquin, 5500 B.C. to 4500 B.C.

Wisconsin Glaciation at the Time of the Transition from Lake Algonquin to Lakes Chippewa and Stanley: 4500 B.C. to 3500 B.C.

Figure 85 shows the Wisconsin glaciation at the time of the transition from Lake Algonquin to Lakes Chippewa and Stanley. Following Lake Algonquin there was a transitional period during which there was a gradual lowering of

water levels by stages amounting to some 200 feet (Stanley, 1936, 1937). This period has been called Lower Algonquin (Leverett and Taylor, 1915) and Lake Algonquin IV (cf. Flint, 1947, p. 261), but Hough (1953, p. 70), gives evidence that suggests that the name "Algonquin" should be restricted to the stage previously called "highest Algonquin." Stanley (1936, 1937, 1943) demonstrated that there were at least four beaches below the Algonquin beach. Moreover, these beaches, essentially parallel, pass southward beneath the plane of the Nipissing beach, thus proving "contrary to Leverett and Taylor (1915) that drainage through lower outlets rather than upwarping of the land was responsible for the lake stages between Lake Algonquin and the Nipissing Great Lakes."

The drainage of this transitional stage was through the Kirkfield (Ontario) outlet into the Ontario basin (Hough, 1953, p. 67, and Fig. 24). Moreover this seems to have been the only period in which the Kirkfield-Fenelon Falls-Trent outlet was used (cf. Hough, 1953). While this outlet was active the water levels of Lake Iroquois in the Ontario basin (cf. Fairchild, 1908, p. 59, Plate 42) were lowered (Leverett and Taylor, 1915, pp. 444-6). Lake Iroquois must have reached lower levels by at least 3000 B.C. for that is the radiocarbon date of an Indian occupancy of an island (Frontenac Island, Cayuga Lake) that would have been submerged while Lake Iroquois stood at its higher levels (cf. Flint and Deevey, 1951, p. 283). It seems likely, however, that Lake Iroquois levels were falling somewhat earlier, say before 3500 B.C., if one is willing to accept the dating of Lakes Chippewa and Stanley, explained in a subsequent section. During the period of transition from Lake Algonquin to Lakes Chippewa and Stanley, ice still occupied the Mattawa valley and the east coast of Lake Superior (Stanley, 1943, p. 528). In the early part of this period ice was present in the northeastern part of Georgian Bay (Stanley, 1943, p. 528). And it seems likely that a local icecap on the elevated region of Parc des Laurentides in Quebec dammed the St. Lawrence and prevented the marine waters from entering the lowlands (Osborne, 1951, pp. 222-51) at this time. Ice stood along the northern border of glacial Lake Agassiz.

The position of the southern ice front suggests that the icecap generally was shrinking toward a Hudson's Bay center. Accordingly, the northern ice margins have been drawn in terms of a southward retreat towards the Hudson's Bay center.

The climate at this time was relatively warm, for this was the period of the thermal maximum or optimum or, as most archaeologists term it, the Altithermal period (Antevs, 1948). This unusually warm period began about 5000 B.C. and has been generally dated by a variety of events indicative of warm climates. By analysis of ocean bottom sediments dated by the "percentage of equilibrium method for uranium, ionium, and radium," Hough (1953a, p. 257) demonstrates "a distinctly warm period — centered at a time about 6000 years ago." The Altithermal drought was registered in the west as early as 4000 B.C. because that is the radiocarbon date of the beginning of the dust layers in the Leonard rockshelter in Nevada (Heizer, 1951, p. 24).

In Oregon the pollen of pines and grasses indicative of a climate warmer than previously can be correlated with pumice from the explosion of Mt. Mazama about 4500 B.C. (Flint and Deevey, 1951, pp. 278-9). When this event occurred the level of Summer Lake in Oregon was 80 feet above its present stand (Flint and Deevey, 1951, p. 279), thus suggesting that the northern part of the Intermountain area was not so hard hit by the Altithermal drought as was the central portion. Moreover the southern part of the Intermountain area may have been

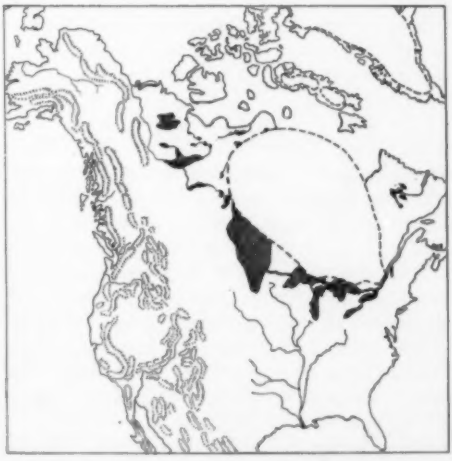

FIG. 85. Wisconsin glaciation at the time of the transition from Lake Algonquin to lakes Chippewa and Stanley. 4500 B.C. to 3500 B.C.

moister, at least in early Altithermal times, because the Sulphur Spring stage of Cochise culture, associated with oak and hickory in southern Arizona, has been radiocarbon dated at about 5800 B.C. and 4200 B.C. (Arnold and Libby, 1951, pp. 8, 15). This area became progressively warmer and/or drier.

In the plains, among the manifestations of the long drought are windblown deposits. In Nebraska (Terrace II) soils buried by loess were dated at 5857 B.C. and 5474 B.C. (Libby, 1952, pp. 4-5) and earlier (Schultz, Lueninghoener, and Frankforter, 1951, p. 34). A later soil (Terrace I) was dated at about 2000 B.C. (Libby, 1952, p. 5), thus the loess deposited sometime between about 5500 B.C. and 2000 B.C. must represent the Altithermal in the plains. Evidence of increasing or at least prevailing warmer weather in the east is manifested by the presence of pine in northern Minnesota at about 5000 B.C. and in Maine at about 4000 B.C. (Flint and Deevey, 1951, p. 272).

Wisconsin Glaciation at the Time of Lakes Chippewa and Stanley: 3500 B.C. to 2000 B.C.

Figure 86 shows the Wisconsin glaciation at the time of Lakes Chippewa and Stanley, a stage of low water. When the glacial ice in the Mattawa Valley, Ontario, melted, the water in the upper Great Lakes drained nearly to sea level by way of the Mattawa and Ottawa valleys. Thus the opening of the Mattawa or North Bay outlet inaugurated a stage of very low water levels in the western Great Lakes basins (Antevs, 1939, pp. 717-18; Hough, 1952; 1953, pp. 71-83; Stanley, 1936, 1937, 1938, 1941, 1943, 1945, 1948). The waters in the Lake Michigan basin fell to a point 350 feet beneath their present level to form Lake Chippewa (Hough, 1952, p. 1265; 1953, pp. 71-83).

The waters in the Huron basin fell to a level at least 400 feet beneath their present stand to form Lake Stanley (Hough, 1953, pp. 71-83). Lake Chippewa was connected to Lake Stanley by a river about 70 miles long which passed through the Straits of Mackinac (Hough, 1953, pp. 80-1; Stanley, 1938, 1945). The waters in the Lake Superior basin probably dropped to a level at least 400 feet beneath the present surface and drained into Lake Stanley via the St. Mary's River. Lake Erie, too, must have been lowered at least to the level of its outlet at Niagara Falls. It was at this time separated from the Huron basin by a considerable expanse of dry land. The Ontario basin, apparently was independent of Lakes Chippewa and Stanley and connected with the Ottawa Sea, a marine transgression of the St. Lawrence lowland. North of the Great Lakes and south of Hudson's Bay there was a tremendous glacial lake named Ojibway-Barlow (Antevs, 1928, p. 103; Flint, *et al.*, 1945) formed by water ponded between the ice front and the height of land. In its initial stages the lake was probably divided into two lakes, Lake Ojibway north of the Huron and Superior basins and Lake Barlow to the east. Lake Ojibway-Barlow was obviously formed after the transition period between Lake Algonquin and Lakes Chippewa and Stanley, because until such time the ice was too far south (Hough, 1953; Stanley, 1941) to allow formation of the lake.

Although Lake Ojibway-Barlow may have had outlets to the Superior and Huron basins, the main outlet seems to have been the Ottawa River. The post-Algonquin, pre-Nipissing upwarping of the land should have closed all of the southward points of drainage, particularly the Ottawa River outlet. The rapid northward drainage and extinction of Lake

Fig. 86. Wisconsin glaciation at the time of Lakes Chippewa and Stanley 3500 B.C. to 2000 B.C.

Ojibway-Barlow described by Antevs (1928, p. 104) could best have occurred at this time.

Since the upwarping that should have closed the southern outlets occurred just before the Nipissing stage, radiocarbon dated at 1500 B.C., it seems likely that Lake Ojibway-Barlow is earlier than 1500 B.C. Antevs (1928, pp. 154-5) counted some 2000 years of clay varves on the bottom of Lake Ojibway-Barlow. These 2000 years added to 1500 B.C. provide a maximum date of about 3500 B.C. for the beginning of Lake Ojibway-Barlow, and indirectly provides an approximate date for Lakes Chippewa and Stanley, e.g., about 3500 B.C. or before to 2000 B.C.

Glacial Lake Agassiz lay to the west of glacial Lake Ojibway-Barlow and the Superior basin, but just what stage of Lake Agassiz should be correlated with Lakes Chippewa and Stanley is undecided. It is tempting to correlate the McCauleyville beach stage of Lake Agassiz (Leverett and Sardeson, 1932, p. 139) and its probable eastward drainage with the low water stage of the Great Lakes. The southern margins of the Laurentide ice sheet can be approximately located by the glacial lakes in front of them. It seems obvious that the southern front of the ice sheet had retreated considerably and probably the northern front had melted southward. What evidence exists, suggests that the icecap was confined to the Hudson's Bay lowlands. The relatively rapid melting of the ice was caused by the warm climate that prevailed at this time (within the Altithermal period).

FIG. 87. Wisconsin glaciation at the time of the Nipissing Great Lakes and the Cochrane advance 2000 B.C. to 1000 B.C.

Botanical fossils from the vicinity of Ottawa, Ontario, include such comparatively warm climate types as sugar maple, balsam, poplar, and yellow birch (Flint and Deevey, 1951, p. 285). These should all be products of Altithermal times. Moreover, in the Lake Ontario border of New York state, acorns, hickory nuts, and butternuts have been found associated with cultural remains radiocarbon dated at about 3000 B.C. or earlier (Ritchie, 1945, pp. 8, 26, 1951, pp. 130-5). These trees like those in the vicinity of Ottawa are indicators of a relatively warmer climate than had prevailed earlier in the region. Moreover, these trees were growing in areas not far from the Ottawa Sea, a marine transgression in the St. Lawrence lowlands. The presence of a warm-water marine mollusk in the deposits just above the Boylston Street fishweir in Boston that have been radiocarbon dated at about 1900 B.C. (Flint and Deevey, 1951, p. 278) is additional evidence of a generally warm period. Pollen levels recording a warm climate in Connecticut have radiocarbon dates as early as 3000 B.C. and as late as the beginning of the Christian era (Flint and Deevey, 1951, p. 277).

It was at some time within the Altithermal period that the prairies expanded eastward and northward, and perhaps westward, and the northernmost advance of forests with oak and hickory took place in the east (cf. Antevs, 1950, pp. 133, 136-7; Sears, 1932, 1950, p. 136).

WISCONSIN GLACIATION AT THE TIME OF THE NIPISSING GREAT LAKES: 2000 B.C. to 1000 B.C.

Figure 87 shows the late Wisconsin glaciation at the time of the Nipissing Great Lakes. At the end of the lakes stage that included Lakes Chippewa and Stanley there was a general upwarping of the land in the northern part of the Huron and Michigan basins. This upwarping eventually terminated the use of the North Bay-Mattawa Valley-Ottawa River outlet causing a rise in water levels in the Michigan, Huron, and probably Superior basins (Hough, 1953, pp. 84-91). The water rose to the former level of Lake Algonquin in the upwarped areas and flowed through the southern outlets. The Nipissing stage was terminated

by the down-cutting of probably the Port Huron outlet and the lake level was lowered rather rapidly to the Algoma stage level (Hough, 1953, p. 91).

Several radiocarbon dated events encompass the Nipissing stage. An archaeological site on the southeastern shore of Lake Huron associated with deposits at the Algoma level has been dated at 667 B.C. Thus Nipissing is earlier than 667 B.C. A date of 1518 B.C. was obtained for the Nipissing beach level in southern Lake Michigan and a date of 1705 B.C. was obtained from peat in the Nipissing beach in the southwestern part of Lake Superior (Hough, 1953, pp. 90-1, 93). Thus Lake Nipissing existed from at least 1705 B.C. to 1518 B.C. It would therefore seem reasonable to assign a date of about 2000 B.C. to 1000 B.C. for the Nipissing stage.

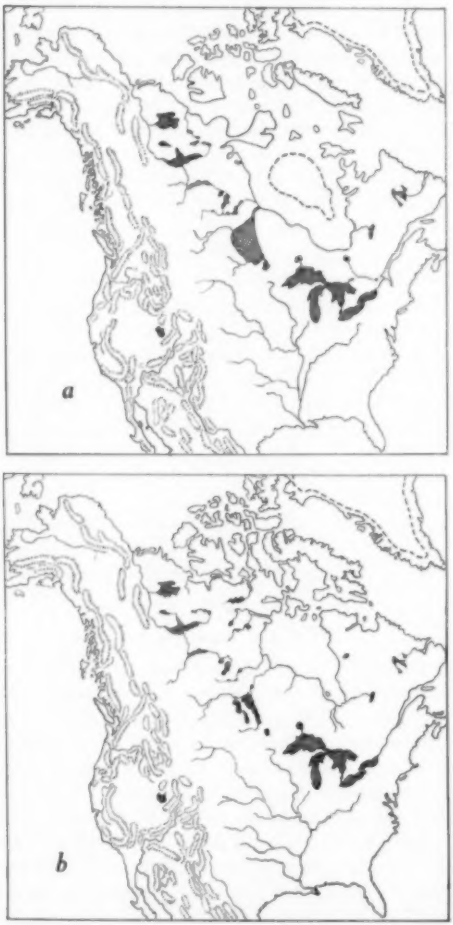

FIG. 88*a*. Wisconsin glaciation at the time of the Algoma stage of the Great Lakes. 1000 B.C. to 500 B.C. *b*. Base map of North America.

It was suggested previously that the upwarping that inaugurated the Nipissing stage could be correlated with the northward draining of Lake Ojibway-Barlow. In any event there is a general correlation based upon the succession of lake stages and associated positions of the ice front. The point of this is that there is a minor glacial advance, the Cochrane (Antevs, 1928, pp. 103, 148-9) which probably occurred in the Nipissing stage. It certainly could not be older than the time of Lakes Chippewa and Stanley and it is unlikely that it is younger than Nipissing.

If the interpretations presented here are correct, the Cochrane advance correlates with the Nipissing stage. Some supporting evidence of this comes from Hough's analysis of ocean core samples (Hough, 1953a) that were dated with the aid of Urey's "per cent of equilibrium" method. Hough (1953a, p. 257) shows that there was a brief abnormally cool period centered at 1250 B.C., the first such period since Valders-Mankato time. I would correlate this cool period with the Cochrane glacial advance. Another possible correlative is the Nebraska Terrace I fill (Schultz, Lueninghoener, and Frankforter, 1951, pp. 8-9) dated at about 2000 B.C. (Libby, 1952, p. 5). Also a six-foot eustatic fall in sea level, radiocarbon dated about 1500 B.C. (Libby, 1952, pp. 8-9), might properly be correlated with the Cochrane advance. Following this advance, there was a retreat of the icecap which must have shrunk toward, and probably into the center of Hudson's Bay. And for all I know there may be chunks of it floating there yet.

Lake Ojibway-Barlow drained suddenly into Hudson's Bay just prior to the Cochrane advance or just after the advance (cf. Antevs, 1928, p. 103, 148-9). It is probable that Lake Agassiz began draining northward at this time, certainly not later than the Cochrane retreat. This event should have been some time much later than the McCauleyville beach stage of Lake Agassiz.

It would seem reasonable to terminate the Altithermal period with the abnormally cool

period centered at 1250 B.C. that may have followed the Cochrane advance. There were, however, later warm dry periods (Hough, 1953a, p. 257). At Signal Butte, Nebraska, there were windblown deposits (indicative of warmth and dryness) on top of cultural materials dated at 1500 B.C. and 1000 B.C. (Kulp, Feeley, and Tryon, 1951, p. 566).

These, and other data, suggest that although the long drought may have been over, there were shorter warm dry periods that tended to perpetuate Altithermal characteristics, especially in the east.

WISCONSIN GLACIATION AT THE TIME OF THE ALGOMA STAGE OF THE GREAT LAKES: 1000 B.C. to 500 B.C.

Figure 88 shows the Wisconsin glaciation at the time of the Algoma stage of the Great Lakes. With the retreat of the Cochrane glacier there was a marine transgression of the Hudson's Bay lowlands. (The loci of Dorset sites would have been under water during the period of high water levels in Hudson's Bay.) Subsequently, upwarping of the land (more than 700 feet along the east coast of Hudson's Bay) reduced Hudson's Bay to its present size. In the Great Lakes the probable down-cutting of the Port Huron outlet reduced lake levels from the Nipissing stage to the Algoma stage. As noted previously, the Algoma stage seems to be dated at 667 B.C. It may possibly be significant that there was a brief, abnormally cool period at 850 B.C. (Hough, 1953a, p. 257), which may correlate with the Algoma stage. Somewhat later there was an unusually warm period centered about A.D. 50 (Hough, 1953a, p. 257). A possible corollary of this is the level of the hickory maximum in Connecticut, radiocarbon dated at A.D. 150 (Flint and Deevey, 1951, p. 277).

It seems likely that the modern natural areas as outlined by Kroeber (1939) came into being in the period following the Altithermal and probably before the beginning of the Christian era.

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CULTURAL STRATIGRAPHY IN PANAMA: A PRELIMINARY REPORT ON THE GIRÓN SITE *

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THE ARCHAEOLOGY of Panama, like that of most of lower Central America and the north Andes, has but recently emerged from a purely descriptive stage. The formulation of cultural-geographical divisions in ceramic and sculptural styles — "Cultures" as these are sometimes called — has been the most important attempt at synthesis. Lothrop (1948) envisaged four such "culture areas": (1) Darien (Panama below the Canal Zone); (2) Coclé (the Pacific watershed in Coclé, Herrera, and Las Tablas Provinces); (3) Veraguas (Pacific highland Panama in the Province of the same name); and (4) Chiriquí (the upland country of Chiriquí Province and adjacent Costa Rica). To these Stirling and Rands (personal communication) have recently added what is probably a fifth, the Atlantic coastal strip above the Canal Zone. The internal coherence or unity of these "culture areas" is of a most general sort. Darien, as seen from the work of Linné (1929) and Stirling (1950, p. 234), appears to be a loosely allied aggregation of complexes or site components bound together only by plastic pottery decorative techniques such as incision, punctation, and relief modeling. Several distinct stylistic strains are evident, but, as yet, there has been so little published on this area that none of the styles and complexes can be properly defined. A "Coclé culture" is conceived with greater clarity than Darien if Lothrop's (1937-42) excellent descriptions of Sitio Conte are accepted as a definition, but when the Coclé concept is spread to embrace the "Coclé area" the result is much less sharp and satisfactory. The Veraguas (Lothrop, 1950) and Chiriquí (Holmes, 1888; MacCurdy, 1911; Osgood, 1935) "culture areas" seem to display somewhat greater internal cohesiveness than either Darien or Coclé as each name evokes a well-defined stylistic complex of pottery, metal work, and grave types; but recent evidences from Chiriquí (Stirling, 1950, pp. 234, 243) strongly suggest that the "classic" Chiriquían culture or complex is not the only one in that area.

It is our purpose in this paper to demonstrate the time-depth complexity within one of these "culture areas," the Coclé. This is not primarily a critique of Lothrop's "areas." These concepts have served, and still serve, in the understanding of prehistory on the isthmus; but they are tools for cultural-geographical sorting adapted to a phase of research that we are now probably ready to go beyond. With the beginnings of regional chronologies and with the greater emphasis placed upon stylistic variation and differentiation which time depth entails, the "culture areas" tend to dissolve. It becomes necessary to construct new entities which are assimilable to the problems of sequence cross-matching and the tracing out of specific lines of culture history. It is our aim here, then, to define and present, in brief form, such cultural units from within the "Coclé area" and to describe an archaeological site stratification which has been useful in making these definitions.

THE GIRÓN SITE

The Girón site lies at the base of the Azuero Peninsula in the Parita Bay region of western Pacific Panama. It is approximately 80 miles west-southwest of the Panama Canal Zone

* The field explorations described in this paper are a part of a larger program of archaeological research in Panama. These investigations were begun in 1948 by M. W. Stirling and G. R. Willey for the Bureau of American Ethnology, Smithsonian Institution and the National Geographic Society. They were continued in 1952 by Willey, assisted by C. R. McGimsey and J. N. East, on behalf of the Peabody Museum, Harvard University. Three preliminary articles (Stirling, 1949; Willey, 1951; Willey and McGimsey, 1952) and a monograph (Willey and McGimsey, n.d.) treat of the 1948 season and of the additional 1952 excavations in certain early shell mound sites of the Parita Bay littoral. The present report gives preliminary results on the sites and cultures of the later prehistoric periods of the same region. A second monograph (Willey, n.d.) now in preparation, will describe and analyze these later sites and materials in detail.

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and 25 miles south of the famed Sitio Conte. This is rolling hill country, grass-covered and with scattered clumps of jungle trees. A number of rivers wind through the hills to empty into Parita Bay. The bordering river valley flats of these streams vary in size; the bottomlands of the Santa María River, the largest in the area, are several miles across while those of the Parita River are less than a mile. These river valleys are today the prime lands of the eastern Azuero Peninsula. They sustain stands of corn, sugar cane, and other crops, and during the dry season (December to April) some of them are used for grazing. In prehistoric times the same valleys were favored habitations of the Indians.

The Girón site is in Coclé Province on the north bank of the Santa María River, 7 airline miles from the delta. The Santa María, which flows east-southeast across the base of the Azuero Peninsula to Parita Bay, is the boundary separating Coclé and Herrera provinces. The property of Sr. Aristide Girón, on which the site is located, is in the broad alluvial plain section of the valley some little distance upstream from the tidal mud flats, or "alvinas," which lie immediately back of the active shore line of the bay. Although there is good evidence that the coast line of Parita Bay was once further inland than it is today (Willey and McGimsey, 1952; n.d.), there is little reason to believe the Girón site was ever on an active shore. At the time of site occupation, as now, the immediate environs were most probably those of the alluvial plains. The river is, at present, affected by the tides as far up as the Girón site, although the marine shellfish species found in the site refuse are no longer taken from the river. It is possible that they were in the past, but it is more likely that the Indian inhabitants of Girón traveled the few miles downstream to oyster beds at the delta and transported the shellfish by canoe.

The site itself consists of refuse accumulations on the slopes and around the base of a natural hill near the riverbank. This hill, one of two in the neighborhood, is an outcrop formation rising some 12 meters above the plain. In the past, as today, it offered a refuge from the high waters of the wet season, and there is a considerable scattering of potsherds and shell detritus on the south slopes, or river side, of the hill. Members of the Girón family state that casual excavations on this same slope had, in the past, exposed human bones and pottery vessels. The bulk of the refuse, however, is concentrated in three piles around the foot of the hill, and the most conspicuous of these dumps is one which has been cut through and exposed by the river. In extent, this particular refuse hummock appears to be the smallest of the three, measuring not much more than 10 by 20 meters; but a full depth of 1.80 meters is shown in the riverbank. As there is a tremendous quantity of broken pottery in the mud and under the water at the foot of the bank, it is obvious that the deposit once extended farther out into what is now the river but has been carved away by the action of the stream. Viewed from the surface the refuse mound shows only as a slight eminence a few centimeters higher than the surrounding ground level; but the river-edge profile makes it evident that alluvial clays have been built up surrounding the shell and pottery heap until they almost, but not quite, cover it. Twenty meters west (upstream) or east (downstream) from this debris pile there is only a thin zone of shell midden, 30 centimeters thick, which is buried at a depth of 1.80 meters beneath the flood-carried clays. Apparently, this represents the original ground level at the time of first occupation. The refuse pile must have been begun on this older level.

The other two refuse concentrations at Girón are larger in extent than the first. One lies off the northwest corner of the hill, 70 meters northwest of the first pile. The extent of this dump is at least 50 by 60 meters, and the one small test which we made in it showed 1.30 meters of refuse depth. The last midden area is over 200 meters northeast of the riverbank midden pile, and it extends over a diameter of more than 100 meters on the east slope and at the east foot of the hill. No tests were made in this section, but the surface mounding of the shell suggests that it is at least 1.00 meter deep.

Test pit excavations were carried out at the Girón site in early April of 1952. Pit I, a 3.00 by 3.00 meter cut, was put down in what we have referred to above as the first, or riverbank, refuse pile. This pit was placed 5.00 meters from the river's edge on the summit of the midden hummock. There were no marked differences in the physical strata eventually exposed by our excavation. Shell refuse and potsherds were encountered im-

mediately below the surface, and a top stratum of approximately 50 cms. thickness was characterized by gray organic soil and broken shells. From the 50 cm. mark down to 90 cms. below surface shells tended to be whole and to be mixed with a brown sandy soil. From 90 cms. to 1.65 meters the shells and sherds were packed tightly with brown alluvial clay. The lower portion of the midden had, obviously, been infiltrated by the flood waters of the river. Such floods are annual events at the present time. Below a depth of 1.65 meters there were no shells, and the soil was a dark red-brown alluvial clay. Our excavations penetrated to a depth of 2.30 meters into this clay base. The shells of pit I excavation are, for the most part, oysters (*Ostrea chilensis*). (These and other shells identified by Robert E. Greengo, Department of Anthropology, Harvard University.) Other species were present in the excavation, including *Ostrea mexicana, Pitan tortosa, Scapharea tuberculosa, Natica unifasciata, Anadosa grandis, Cadium ringens, Fasciolaria salmo,* and *Thais haemostoma.* Although shell samples were not saved quantitatively we retain the impression that the oysters were found in numerically greater proportions above a depth of 1.00 meter. In the shell, the pottery fragments were taken out by the hundreds per arbitrary 10 cm. level, but below 1.65 meters only a few sherds were recovered from the underlying clay. In addition to the shell refuse and the pottery, we found occasional stone weapons or tools, a few irregular burned clay briquettes, small water-worn cobbles, and bits of animal bone.

Our other two pit excavations at the Girón site are less important for the stratigraphic story than pit I. Pit II was a 3.00 meter cut placed 40 meters west of pit I. At this point no shell refuse showed on the surface, but the thin buried stratum of shell and pottery was observed in the nearby riverbank. Although pit II was located only 5 meters back from the riverbank we did not locate this buried midden stratum in the excavation. The pit was carried down to a depth of 2.20 meters. The top 80 cms. was completely sterile red-brown river clay. Below the 80 cm. line potsherds appeared and continued down to a total depth of 2.20 meters. All of the sherds were badly eroded, and it is clear that they had been water-carried, or churned, along with the clay in which they were imbedded. Our excavations did not go below 2.20 meters although it is likely that sherds continue deeper than this. The implied water redistribution of materials seemed to negate any possibility of significant stratigraphic results at this spot.

Pit III, a 1.00 by 1.00 meter test, was located in the refuse dump off the edge of the northwest corner of the natural hill. The refuse composition was much like that of pit I. Sherds were found in appreciable numbers down to 1.10 meters. From 1.10 to 1.35 meters there were fewer shells and sherds, and from 1.35 to 1.60 only sterile red-brown clay was encountered.

The pottery of the Girón site excavations may be divided into two groups upon the bases of typological differences and the correlation of these differences with relative depths in the refuse accumulations. The stratigraphically lower, and earlier, ceramic materials will be referred to as the Santa María complex; those of the upper stratigraphic proveniences will be designated as belonging to two complexes, El Hatillo and Coclé. The name Santa María is derived locally from the river and is here applied for the first time in a Panamanian archaeological context. El Hatillo is a name taken from a site near Parita (Stirling, 1949, p. 394, site "He-4"). This site has never been described in detail (Willey, n.d.), but its size and the scope of the excavations undertaken there make it a likely type-site for the style of pottery (Stirling, 1949, p. 376, *top* and *bottom, left* and *right*) associated with the site. The name Coclé is well known. We use it here in a limited or restricted sense to refer to the polychrome pottery style that is characteristic of the Sitio Conte (Lothrop, 1942).

The principal pottery types of the Santa María complex include a polychrome, red painted and plain ware. In addition to these, there is a series of types of minor numerical importance which features incision, punctation, stamping, or appliqué techniques. The same ware, paste, and temper qualities are found in all types. The paste of Santa María ware ranges from light buff (Maerz and Paul, 1930, "Cork," pl. 12 B-7) to dark brown ("Beaver," pl. 15 A-6).[1] There are at least four kinds of tempering material. One of these is a crushed white, noncalcareous rock, probably quartzite. The particles are visible to the eye but are very fine. Equally small are angular fragments of crushed purple rock. Slightly larger particles of translucent quartz sand, some-

[1] Maerz and Paul, 1930, used in the color descriptions throughout this paper.

times angular, sometimes smooth, are a third temper type. Finally, there are occasional rounded, large lumps of dark brown material which appears to be hematite. Most Santa María pottery has a hardness of between 3 and 4 on the Mohs scale. Thickness varies greatly, depending upon size of vessel or particular section of vessel wall. A range of 6 to 20 mms. with an average of 9 mms. is recorded.

Santa María Polychrome utilizes a buff ground color which varies considerably in subtleties of shading ("Persimmon," pl. 6 E-12; "Musk-Melon," pl. 11 A-8; "Oak-buff," pl. 13 D-7). In some instances a wash or a slip has been applied to achieve this color; in others, it is obvious that there has been no addition to the natural fired color of the ware. There is similar variation in the red pigment which has been applied over the ground color ("Nasturtium," pl. 4 I-12; "Korean," pl. 5 J-11; "Spanish Cedar" pl. 6 J-10). The third pigment in the polychrome combination is a dull black. These three colors are combined into various patterns and applied to a number of vessel forms. From the permutations of these combinations several subtypes appear as reasonably stable associations of form and design. One of these is a cross-hatched decorative motif which is invariably allied with a large globular, or subglobular, jar with an outflared collar. The basal half of these vessels is solid red, and the collar or neck is painted in the same shade. The upper half of the body, which has been left buff, is crossed by hourglass shaped figures which have been filled with broad-line black cross hachure (Fig. 89, *k, l*). A second subtype incorporates both collared jars and smaller bowls with incurved rims. Color is used in the same way with the main design elements being carried out in black-on-buff. These elements are bands of parallel horizontal or vertical lines, pendant triangles (Fig. 89, *m*), and lozenge-shaped figures. A third subtype utilizes a complete exterior red slip over which the black designs are placed (Fig. 89, *j*). Decorative elements and vessel forms are much the same as in the second subtype. Still another decorative variant is a wide solid black band encircling a bowl with an incurved rim. The base of the bowl is red, and a continuous zigzag or chevron design of parallel lines runs through the black encircling band (Fig. 89, *p*). This chevron design is effected by the buff background, negative fashion, although the technique is a positive one.[2] There are also two subtypes associated with open bowls. On one of these the bowls are of medium depth, have thickened rims, and wide flat lips. The bowl interiors are red slipped; the exteriors are left buff. Black designs, including cross-hachure, radial bands, circumferential bands, scallops, chevrons, and other geometric elements, occur on top of the lip. The second open bowl subtype often has an interior red slip, and the interior surface is bisected with parallel black lines running from lip to lip (Fig. 89, *n, o*).

The Santa María type Red Daubed follows Santa María Polychrome in its range of vessel forms. Large jars or ollas with high flared collars, bowls and ollas with short everted rims, and shallow bowls and plates make up the list. The decoration consists of irregular smears, dribbles, wipings, and daubs of red paint. These paint smears may be on either exteriors or interiors. The nearest thing to patterns in this use of paint are occasional fields of tear-drop shaped blobs or vertical streaks.

Santa María Red is found in the same vessel forms as the Red Daubed type, plus an "incensario," or plate with dipper-type handle. The red pigment is often applied as a slip on exteriors, interiors, or both. Sometimes only red rim bands are featured, and less often, multiple horizontal bands are placed on vessel interiors or exterior walls.

Santa María Plain vessels are almost identical with those of the Red Daubed and Red types. The high collared jars or ollas, globular vessels with short everted rims, bowls, and plates are all present. Some few sherds suggest the flared edges of tall pedestal bases, but complete pedestal base sherds were not encountered.

Several minority types, with plastic decorative treatment, show ware and vessel form characteristics related to the plain and painted types. One of these has shell-edge stamped impressions arranged in rows (Fig. 89, *r*). Another features deep incised lines and hollow-reed punctates in a band encircling the top of a horizontally everted rim (Fig. 89, *q*). Still another type has fine parallel incised lines vertically placed on the shoulders and sides of small collared ollas or jars (Fig. 89, *s*). There are several others, each represented by only a few sherds from our Girón site tests, which bear punctations, incisions, or appliqué features of various kinds.

Pottery of the El Hatillo complex found at the Girón site consists of the two types, El Hatillo Polychrome and Delgado Red. A substantial sample of both was taken from the Girón test excavations, and type descriptions also have been supplemented by the large collections of each that were recovered from the Delgado site in the Parita River Valley, some 12 miles south of Girón. El Hatillo Polychrome and Delgado Red are, in general, slightly harder surfaced, slightly thinner, and somewhat sandier than the Santa María types. The paste color ranges from a dark ("Persimmon," pl. 6 E-12 and "Agate," pl. 6 H-12) to a light brown ("Cognac," pl. 4 J-11). One of the most characteristic features of El Hatillo Polychrome is a tan or brownish slip color. It is never dead-white as is most of the Coclé Polychrome. The El Hatillo slip ranges through a light buff-tan ("Cornhusk," pl. 10 E-6 and "Cinnamon," pl. 12 E-7), a tan-orange ("Tan," pl. 12 L-11), and a rose-orange ("Maya," pl. 12 A-10). It is decorated in a shade of red quite close to that of the Santa María pottery (see

[2] Any reference to "negative" decoration in this paper pertains to negative design, not a negative or resist-dye technique. The latter, which is common in the "Chiriquí area," has not yet been reported from the "Coclé area."

FIG. 89. Coclé, El Hatillo, and Santa María pottery types. *a, b,* Coclé Polychrome from Girón site (red, purple, and black on white); *c-g, i,* El Hatillo Polychrome with *e* and *f* from Girón site and others from Delgado site (red, purple, and black on tan); *h,* Delgado Red from Girón site; *j-p,* Santa María Polychrome from Girón site (black and red on natural buff); *q-s,* incised, punctated, and shell-edge stamped sherds associated with Santa María types at Girón site.

"Monterrey," pl. 5 J-12, and also "Korea," and "Morocco," pl. 5 J-11 and K-11). Black runs from dull to glossy, and purple is sometimes added as a third design color ("Cedar," pl. 9 H-7 to "Liver Brown," pl. 9 H-9). Plates with thickened margins, shallow open bowls, ollas or jars with short collars and horizontally everted rims, subglobular ollas with constricted orifices, and effigy jars and bowls are the usual El Hatillo forms. Tall pedestals (Fig. 89, *i*) and ring bases are common. The interiors of plates and shallow bowls are decorated with broad scroll elements or bands in either red or purple bordered with narrow black lines (Fig. 89, *d*). In these designs there is usually background ornamentation in attached fields of parallel black lines. It is probable that most of these interior plate motifs are highly stylized animal or demon concepts. Such a demon figure, recognized by Lothrop (1942, pp. 119 ff., Fig. 224) as the "crocodile god" motif in his "Foreign Style A" from Sitio Conte, is a central decorative feature on the exterior sides or shoulders of globular jars. This god face is presented front view with concentric circle eyes, oval mouth, teeth, and nostrils. Fields of black line hachure surround the face (Fig. 89, *e*, *g*). There are also panel designs in El Hatillo Polychrome which may be very reduced demon or god faces. These are arranged in an encircling band around an olla or jar and consist of lozenge-shaped or D-shaped units, each composed of a series of concentric bordering black lines surrounding an interior hook or scroll element. Red or purple are used in small bands within these units (Fig. 89, *c*). Another frequent panel section is rectangulate or trapezoid and filled with serried diamond elements which may be red or purple.

Delgado Red varies in the application of the red pigment. Some specimens show an over-all use of the color ("Moroccan," "Korean," or "Monterrey") on both sides of the vessel. Shallow bowls or plates are sometimes slipped on the interior only. Globular, small-mouthed vessels bear exterior painting. A frequent pattern is a plain, wide band on the exterior below the rim with the lower portion of the vessel red slipped. Equally common is the reverse: a narrow red rim band and the remainder of the body left plain. In classification, it was at first attempted to separate a plain from a red type, but subsequent examinations revealed that any sherd of large size showed red pigment on some portion of its surface. For example, loop handles, a characteristic feature of the plain Delgado sherds are often unpainted; but the attached sections of the vessel wall were nearly always slipped or in some way zoned with color. The most frequent vessel form, and one which is rare or nonexistent in the Santa María Red type, is the globular or subglobular jar or olla with a constricted orifice and unmodified rim. Other vessels of this same general shape were modified with short collars and horizontally everted rims. Plates, shallow bowls, and the pedestal and ring base features are all common. Loop handles are nearly always placed horizontally on the vessel (Fig. 89, *h*). Strap handles (possibly legs?) are also present but are numerically less important than the loop form. Small button-like nodes, lugs, and spouts are rare but occur. Thus, in spite of similarities in color, and only minor differences in paste and temper, Delgado pottery is distinguishable from the Santa María red-painted types on the basis of form. Bases, pedestals, handles, and the subglobular constricted orifice jar are the outstanding criteria for the Delgado type. The plate and open shallow bowl form is shared by both Santa María and Delgado, but even here there are subtle differences. Whereas the lip of the Santa María plate is most frequently unmodified, the Delgado (and El Hatillo Polychrome) lip is thickened and has a peculiar downward and inward bevel of its outer edge.

Associated with the El Hatillo Polychrome and the Delgado Red in two of the Girón site test pits were a few sherds of Coclé Polychrome. The type has been described from Sitio Conte in great detail (Lothrop, 1942, pp. 11-17). One of its outstanding characteristics is its white or near-white ground slip. All of the Girón sherds were so slipped. Nearly all of them were plate fragments with interior decoration in red ("Chrysanthemum," pl. 5 L-12; "Burnt Sienna," pl. 5 F-12; and "Egyptian Red," pl. 6 L-11), purple (see Maerz and Paul, pl. 47 E-7), and black. The designs are broad red and purple-filled black bordered bands, curvilinear for the most part. Unlike El Hatillo Polychrome, there is little close-spaced black line work as hachure background. The central figures, to judge from the fragmentary specimens, probably were stylized animals (or gods) with hooked or claw-like projections (Fig. 89, *a*, *b*).

As is evident in the descriptions of the excavations, there are no dramatic physical changes in the refuse deposits which we excavated at the Girón site. The stratigraphy of pottery is, instead, borne by the changing frequencies in type percentages computed for each of our arbitrary levels. In pit I, which was carried to a depth of over 2.00 meters, potsherds were relatively plentiful from the surface to 1.60 meters. For example, the top level (0–.10 of a meter) contained 835 sherds, some of the middle levels over 1000, and the 1.50 to 1.60 level, 484 fragments. In this last level, the type Santa María Polychrome accounted for about 17% of the total number of sherds. This percentage remained relatively constant up to level .20–.30 where it dropped to approximately 10%; in level .10–.20 it decreased further to 6%; and in the 0–.10 level diminished to 5%. A significant pattern of occurrence is noted in the pit for the type El Hatillo Polychrome. No sherds of this type were found below a depth of .50 of a meter. At this point it made up a little over 1% of the total and increased in the levels above to approximately 3% in the 0–.10 level. Coclé Polychrome, although occurring in negligible percentages, follows this same vertical distribution, from the .40–.50 level to the top of the pit. The Santa María Red and Santa María Plain types have a similar relationship to the type Delgado Red. The Santa María types run from bottom to top of pit

in appreciable strength but tend to diminish in the upper half meter. Delgado Red occurs as an occasional sherd in the lower levels, but its concentration (of 1% of the total or over) begins in level .40-.50. The various incised, punctated, and shell-edge stamped sherds, which we mentioned in connection with the Santa María types, are largely in the levels lying below .50 of a meter, but some of them particularly the deep-incised and hollow-reed punctated everted rim, also carry over into the upper levels. In no level do these plastic decorated types consist of more than a fraction of 1% of the total.

Pit II proved to be dominated by the El Hatillo, Coclé, and Delgado types. Very few noneroded sherds were found in this pit above 1.65 meters. From 1.65 down to 2.20 meters, Coclé and El Hatillo types appeared mixed with smaller numbers of Santa María Polychrome. Similarly, Delgado Red outnumbered Santa María Red. Although the factor of flooding and redistribution of material must be taken into account in this pit, the mixture of El Hatillo and Coclé types with those of the Santa María complexes suggest the top 50 cm. of pit I.

Pit III penetrated an undisturbed bed deposit to a depth of 1.35 meters. The sherds from this excavation are almost wholly of the Santa María group. There appear to be no significant percentage variations except for a possible slackening of Santa María Polychrome in the upper 30 cms. The various incised types show in small amounts, mainly in the lower levels. There is no El Hatillo or Coclé Polychrome, but Delgado Red comes in as about 1% of the total from level .20-.30 to the top. Pit III obviously parallels the lower portions of the midden as revealed in pit I.

To recapitulate, of the three stratigraphic tests made in the shell and refuse middens at the Girón site one presents a picture of El Hatillo Polychrome, Coclé Polychrome, and Delgado Red pottery types mingling with and replacing the Santa María Polychrome, Red, and Plain types in the uppermost levels of the deposit. A second test pit reveals a mixture of El Hatillo, Coclé, and Delgado types with lesser amounts of the Santa María series. On the basis of this content the midden examined by the second pit may be presumed to cross-date with the upper portion of the refuse of the first pit. The pottery from the third test pit was almost entirely Santa María. Only a few sherds of Delgado Red appeared in the uppermost levels. The dating of this refuse would, thus, correspond to that of the lower portions of the midden of the first pit. Two ceramic periods, or phases (use of the concept and term "phase" here follows that of Kidder, Jennings, and Shook, 1946, p. 9), are abstracted from these data: an earlier represented by the Santa María complex of pottery types and a later represented by the El Hatillo and Coclé pottery complexes. We will refer to these two Girón periods, hereafter, as the Santa María and El Hatillo phases.

Aside from pottery, the artifactual debris from the Girón site is very scanty. Some few stone tools and manufactures were obtained, however. The most numerous of these were celts or axes made of a fine-grained, hard, black igneous rock. There is a suggestion of stratigraphy in the refuse distribution of these axes. In pit I it was noted that the type for the lower, or Santa María, levels had a markedly pointed poll, was roughly chipped on all surfaces, thick and somewhat diamond-shaped in cross section. The upper level celt or axe type, presumably the one associated with the El Hatillo and Coclé ceramics, was trapezoidal in outline, somewhat better smoothed and polished, and flattish in cross section. In addition to the axes, metate and mano fragments were fairly common in pits I and II. The Girón site metate is a thin, oval, well-worked table with a slightly concave surface and no raised side edges. At least some of them were supported with legs. The mano, or hand-stone, is the long, cylindrical type, flattened on a single grinding surface. Both of these artifacts are much more common in the upper, or El Hatillo, levels than in the lower part of the refuse.

Comparisons and Correlations

At the time of excavation and first inspection of the Santa María pottery from the Girón site we knew of no other occurrences of these types except the few vessels and sherds described and illustrated by Lothrop from Sitio Conte. Lothrop discussed what appear to be near-duplicates of some of the Santa María types under the name "Black-Line Geometric Ware" (Lothrop, 1942, pp. 125 ff.). He has this to say about it:

> A common class of pottery vessel at the Sitio Conte is adorned with geometric patterns, for the most part consisting of hatched or crosshatched lines, painted on a field which is the natural color of the clay or on a light slip. Almost without exception examples of this ware have been found in refuse, where large numbers of sherds occurred, but which rarely permitted restoration even of the design. A small bowl type sometimes appeared in graves, however, and large jars turned up in caches.

Our Santa María Polychrome subtypes, the crosshatched, the black-on-buff or black-on-red, and the banded lip are all illustrated by Lothrop. His "Black-Line Geometric Ware" designation, thus, covers a part of what we have included as Santa María Polychrome. Lothrop makes no observation concerning the chronological placement of the type at Sitio Conte other than to leave the impression that it might be relatively early in that it is usually found in refuse into which Coclé period graves had been dug. In an effort to check the possibility of stratigraphy at Sitio Conte, we

examined a large series of sherds taken from trench XI (see Lothrop, 1942, Fig. 2, site map) at that site by the 1931 excavator, L. L. Wedlock.[3] The material from this trench, a 20 by 2 meter cut carried to an average depth of about 3.00 meters, had been removed in arbitrary depth levels of approximately 30 cms. per level. Although these pottery collections were selected samples, of no value in quantitative stratigraphy, it was thought that they might offer some absolute indications of stratification of pottery types. This proved to be the case. The only decorated pottery in the upper one half of the cut, from the surface down to approximately 1.50 meters, was Coclé Polychrome. From 1.50 to 1.90 meters some Coclé Polychrome sherds were found but were mixed together with Santa María types, including the diagnostic Santa María Polychrome in all of its variations. In the lowermost levels, 1.90 to 2.90 meters, the only polychrome pottery was the Santa María type.

From this it is clear that Santa María pottery not only occurs at Sitio Conte but that it is found under stratigraphic conditions somewhat parallel to those we have been describing for the Girón site. That is, it underlies a relatively late polychrome style. At Girón, this late style is, for the most part, El Hatillo; but Coclé Polychrome is associated with El Hatillo in the upper levels. At Sitio Conte, El Hatillo pottery occurs in small quantity in trench XI in those levels in which Coclé Polychrome predominates.

The question of cultural continuity or discontinuity is raised by the Girón and Sitio Conte stratigraphy. At Giron, as we have noted, there are no physical breaks in the deposits, a condition which argues in favor of continuity. The cultural evidence seems to substantiate this. It will be recalled that the plate form of the Santa María Red type carries up into levels of the El Hatillo phase, and the same is true of some of the minor incised and punctated types. The physical stratification at Sitio Conte has been described in some detail (Lothrop, 1937, pp. 36-39 and Fig. 21), but the strata at that site were not correlated with any specific cultural sequence, either the Early Coclé-Late Coclé periods which Lothrop posits or the Santa María and Coclé phases which we now put forward. It is quite possible that some such correlations between soil zones and culture periods could be made, but there is no reason to believe that appreciable time gaps or breaks in occupation would be represented. The Sitio Conte is on a river flood plain, and the intervening sterile strata which separate the midden zones may have resulted from no more than seasonal floods. On the cultural side, the overlapping of pottery type distributions in trench XI and Lothrop's discoveries of occasional "Black - Line Geometric" (or Santa María) vessels in Coclé graves support the case for continuity. Then, too, the incised, punctated, and shell stamped types run through both the Santa María and Coclé phases at Sitio Conte as they did at the Girón site. Lothrop (1942, pp. 170-2) describes and pictures a number of vessel fragments of these types. A punctated type (Figs. 343, 344) is identical to pottery we recovered from Girón test pits as is the incised everted rim (Fig. 345). Additional decorative techniques, including a fine parallel incised (Fig. 346, *f*), shell-edge stamping (Fig. 346, *c*), appliqué ridging and notching (Fig. 349), and stippling (Fig. 350) belong to this same group. Lothrop notes that many of these plastic types occurred in the earliest of the Early Coclé graves or came from "refuse . . . at depths indicating a comparable date." In our preliminary examinations of the trench XI collections from Sitio Conte we observed such types in the Santa María levels as well as in the upper levels where they were in association with Coclé Polychrome.

The sum of the data indicates, then, that the Santa María pottery complex marks a cultural phase which extended around Parita Bay from Sitio Conte at least as far south as the Girón site. This Santa María phase immediately preceded and seems to have been in part ancestral to, such phases as the Coclé at Sitio Conte and the El Hatillo farther south. This brings us to a comparative evaluation of these last named pottery complexes, Coclé and El Hatillo.

[3] We are grateful to Frederick Johnson, a member of the 1931 Sitio Conte expedition, for calling this trench and this collection of pottery to our attention. Lothrop describes trench XI (1937, pp. 297-303) and the four graves and two caches discovered within the excavation; but, except for occasional descriptions of sherds, he does not classify or treat the refuse material in detail or by relative depths. A full analysis of the trench XI collections, now stored in the Peabody Museum, Harvard University, will be presented in a future work (Willey, n.d.).

As is well known, Lothrop divided the grave series from Sitio Conte into two closely related periods, Early Coclé and Late Coclé. The similarities of Early and Late are greater than their differences, and there is considerable stylistic overlap between the pottery lots of these two periods. Even with whole vessels it is often difficult to separate specimens of the two periods. For our very small Coclé Polychrome sherd collection from the upper levels of the Girón site the most dependable diagnostic is the lip form of the interior painted plates. All of the Girón examples have a flattened lip that faces downward and outward, and as Lothrop (1942, pp. 14-15) lists this as a characteristic feature of Early Coclé Polychrome, the chances favor an Early Coclé dating for the Coclé Polychrome sherds from Girón. From this datum, the El Hatillo complex, as represented in the Girón pit collections, is cross-datable with Early Coclé. Whether this cross-dating can be extended upward into contemporaneity with Late Coclé, as well, is an open question. El Hatillo Polychrome occurs at Sitio Conte, apparently in small amounts. Lothrop refers to it, or to types very similar, as "Foreign Style A" (1942, pp. 119-22, Fig. 224) and also as "Macaracas Polychrome" (p. 124, Fig. 228, *b*). He is inclined to date these "foreign" types in his late Coclé period. On the other hand, we noted several sherds of El Hatillo Polychrome in the Sitio Conte trench XI stratigraphic collections where they occurred in levels suggestive of an Early Coclé association. (Willey noted in 1949 that mixed late Coclé and El Hatillo ceramics were recovered from a grave at Sitio Conte excavated by A. J. Mason in 1939.) There is insufficient evidence now at hand, from either Girón or Sitio Conte, to settle this chronological relationship of the two late pottery complexes.

Whatever their relative chronological positions, it is almost a certainty that the Coclé and El Hatillo styles have different geographical centers of distribution. Coclé is based in the north, on the isthmus, with Sitio Conte and environs as an apparent hearth. El Hatillo is best represented in the Azuero Peninsula. The town of Macaracas, in the interior, may be one focus of the style while the vicinity of Parita is certainly another. The vessels and sherds which Lothrop (1942) illustrates from Parita (Figs. 444, *e*; 446, *a*, *b*, *c*, *h*, *f*; 449) and from Macaracas (Figs. 461, *a*, *b*; 462, *a*, *e*, *f*, *h*) all fit into our description of the El Hatillo Polychrome type as this type is seen in the Girón, Delgado, and El Hatillo sites. The presence of Coclé Polychrome in the Parita locality and its relationship to El Hatillo is even more of a puzzle than the relationship of the two styles at Sitio Conte. Near Parita there are sites with graves which yield a "pure," or only slightly variant, Coclé Polychrome and nothing else. The Sitio Pinilla is such a location (Stirling, 1949, pp. 393-94 and p. 376, *middle row* and *bottom center*); yet Sitio Pinilla is not more than two miles from the Delgado site (a "pure" El Hatillo manifestation) and not more than four miles from the El Hatillo type site. The geographical proximity of these sites suggests, again, a chronological difference, but we have no clue as yet as to what this difference might have been.

Summary and Chronological Chart

The midden excavations at the Girón site, on the banks of the Santa María River in western Panama, have revealed a stratification of pottery types in which a complex known as the Santa María underlies two other associated complexes, the El Hatillo and the Coclé. An unreported stratitest excavation from Sitio Conte, 25 miles north of Girón, presents a comparable stratigraphic picture with the Santa María complex preceding the Coclé. It, thus, appears that the Santa María ceramic complex marks a definite chronological period for a large part of the Parita Bay region. As such it can be considered a phase in the prehistory of the region. The two later ceramic complexes, the Coclé and the El Hatillo, bear close typological similarity to each other, sharing together many more elements than either share with the earlier Santa María complex. It is also evident that they are, at least in part, contemporaneous; but whether they were fully coexistent with one another is not known. The Coclé style is dominant in the northern part of the region while the El Hatillo style seems to center to the south, in the Azuero Peninsula. Yet the problem does not resolve itself into one of separate but contemporaneous [illegible]graphical foci. For in the locale of Parita [illegible] appear to be "pure" sites of each style oc[illegible] within a few miles of each other.

In our introductory statements we set forth our aim of demonstrating the cultural complexity in time-depth of what Lothrop has defined as the "Coclé area." This has been done for the central portion of the "area." We have examined the region from Sitio Conte to Parita, an airline distance of no more than 30 miles. This is, in effect, the region of Parita Bay and its interior hinterlands. Lothrop (1948, map 4) has indicated the "Coclé area" as ranging farther south and farther east, encompassing a total mileage about three times as great as our Parita Bay region. There is reason to believe that polychrome pottery styles related to Coclé, as are El Hatillo and Santa María, will be found throughout this greater geographic range. But there is also reason to believe that these variants will be easily distinguished as separable typological, geographical, and chronological units. The reality of the "Coclé area" is not that it is a geographical space linked together by a common culture or a common style. It is, rather, that area of western Pacific Panama (whose exact limits are as yet undefined) bound together by a tradition of polychrome decoration of ceramics. It is an historical entity but an entity of much less internal coherence than the relatively small space-time units for which we have offered introductory definitions as the Santa María, Coclé and El Hatillo phases. Even as a "polychrome pottery tradition," the "Coclé area" dissolves if we drop back further in time than the apparently late chronological ranges we have been dealing with in this paper. At a period before the appearance of the Santa María phase other cultures occupied the Parita Bay region, and these were without polychrome pottery.

In closing, we offer the following chronological outline (Table 13) by way of final summary and to put on record the sequence information that is now available from one small part of Panama. The Parita Bay region is divided into the three localities or zones. These localities are, of course, the accidents of archaeological investigation; but they have, in addition, a certain environmental-cultural reality in that they are based upon three major river drainages: the Rio Grande de Coclé, the Santa María, and the Parita. In both the Parita and Santa María localities sites are known which are representative of the Monagrillo phase. This Monagrillo culture is believed to be the earliest yet discovered in the Parita Bay region (see Willey, 1951; Willey and McGimsey, 1952; n.d.). Its ceramics are predominantly plain or decorated with red painted bands or incision and punctation. The vessel forms are extremely simple. No close relatives to the Monagrillo pottery complex are known. The location of the Monagrillo sites implies that significant coast line changes have taken place since their occupation, that they were once shellfishing stations on active lagoons, and that the food economy of their inhabitants was based principally upon the sea. Subsequent to the Monagrillo, there is another ceramic complex in the Parita zone, the Sarigua. Sarigua sites also are found along old coast or lagoon lines, and Sarigua pottery underlies the later polychrome styles. This Sarigua pottery is quite different from that of Monagrillo although it is decorated by plastic techniques, including incision, punctation, shell-edge stamping, and appliqué ridging. It has no close affinities to known pottery groups, but it is less isolated typologically than Monagrillo. Certain of Linné's pottery finds from Darien are similar (Linné, 1929, pp. 172 ff., Figs. 45-6), but, perhaps more importantly, the minor incised and shell-edge stamped types associated with the Santa María and Coclé complexes are reminiscent of Sarigua. This is particularly true of the vertically arranged fine-line incised decoration which occurred in Santa María levels at the Girón site and which Lothrop figures from Sitio Conte (Lothrop, 1942, Fig. 346, *f*).

There is, then, a suggestion of continuity between Sarigua and Santa María; but the continuity, if it existed, is thin and faint. Santa María pottery styles are dominated by colors, design, and vessel forms that are lacking in Sarigua. It is suggested, as indicated on the chart (Table 13), that there is a major break in the sequence picture at this point. An important piece, or pieces, are missing, and the position of the hiatus appears to be a crucial one. The Monagrillans and Sariguans give every evidence of having been fishermen and shore dwellers, but when we come to the Santa Marían, and from this point upward in the sequence, the inhabitants of the Parita Bay region were inland valley townsmen, presumably agricultural. In other words, the presumed gap in our sequence occurs at a juncture of pro-

TABLE 13.

CHART OF RELATIVE CHRONOLOGY FOR THE PARITA BAY REGION, PANAMA

	Sitio Conte	Lower Santa María River	Parita Zone
A.D. 1500			
	Late Coclé		Parita-Coclé
	Early Coclé	El Hatillo	El Hatillo
1300			
	Santa María	Santa María	
	(Presumed Time Gap or Major Break in Sequence)		
			Sarigua
		Monagrillo	Monagrillo

found cultural change. Is this shift as abrupt as it now appears? Does it mark a new cultural and population influx? Or will a convenient "transition" eventually be found?

In the Lower Santa María River column of Table 13 the El Hatillo phase is placed opposite Early Coclé for the reasons already discussed, but the possibility of its later extension is admitted. In the Parita zone column, El Hatillo should be interpreted as being bracketed with "Parita-Coclé," the local manifestation of the Sitio Conte Coclé style such as that found at Sitio Pinilla.[4] The two estimated dates are those given by Lothrop for the duration of the Coclé phase at Sitio Conte. Each of the columns in Table 13 should be interpreted as signifying continuity of culture, a continuity leading directly into those rich town-states or chieftainships of the early sixteenth century which the Spaniards encountered in the Parita Bay region.

[4] The names "Alvina" and "La Mula" have been used by Willey and McGimsey (1952; n.d.) as temporary designations for small assemblages of polychrome pottery sherds found along the Parita Bay littoral. It is obvious that these "Alvina" and "La Mula" materials relate to one or the other of the late phases of the Parita zone, the parita-Coclé or the El Hatillo. Identification of these materials, and their incorporation into the better established phases, should be possible as analyses progress.

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Peabody Museum
Harvard University
July, 1953

BULL BROOK — A FLUTED POINT SITE IN IPSWICH, MASSACHUSETTS *

DOUGLAS S. BYERS

THE BULL BROOK SITE, near Ipswich, Mass., was discovered in the spring of 1951 by William C. Eldridge, of East Lynn, and Joseph Vaccaro, of Beverly, Massachusetts. Both are members of the Massachusetts Archaeological Society. A brief notice of the site appeared over their names (Eldridge and Vaccaro, 1952). The site was worked by them, with the assistance of Nicola, Frank, and Tony Vaccaro, Alfred Thibodeau, Tony Orsini, E. E. Tizzer, Howard A. Jones, and Douglas Jordan. The last named is preparing a more extensive account of the site and analysis of the collections obtained from it.

The site lay on the south side of Bull Brook, and was situated on a kame terrace jutting into a salt marsh (Fig. 90, *c*). Its surface was approximately 40 feet above sea level. This deposit has been worked for sand and gravel, and the site is to all intents and purposes destroyed.

A neo-Indian site at approximately the same location has been known for years. It produces occasional projectile points of forms common in Archaic to early Woodland context, Vinette I pottery, sherds of the Point Peninsula series, stone implements and European trade goods. Until Joseph Vaccaro found a fluted point in a pile of dirt pushed up by a bulldozer, the paleo-Indian site was unknown. The terrace appears to have been plowed at one time, as the loam, where it could be observed, made very even contact with the sand. A patchy second growth of small oaks, grey birch, white birch, poplars, and white pine has invaded a grassy area that appears to have been an old field, and in which the site was found. An abandoned farm house not far away gives mute testimony of the slight fertility of the soil. Sandy loam extends to a depth of approximately six inches. In this, all the neo-Indian material and white man's goods are found. Below the loam lies about 36 inches of unbedded sand, which rests on cross-bedded sands left by the braided stream that built the kame (Fig. 90, *b*). At about 12 to 16 inches below the loam there is a difference in texture; the sand is softer below that point, more compact above it. Implements of the fluted point complex occurred at about this level (Fig. 90, *a*).

The site was visited by Frederick Johnson and me on several occasions, in 1951, 1952, and 1953. We have never succeeded in observing any objects of the fluted point complex *in situ*. In the autumn of 1952 we were accompanied by Charles E. Stearns, Jr., and Joseph Hartshorn, both of the Department of Geology, Harvard University. Not the least of the problems is that having to do with the means by which the implements became buried. The surface of the land shows differences in elevation that could not have amounted to more than 5 feet over the entire area. There is no sign of an old land surface at the depth at which the fluted point complex occurs. Neither slope wash, wind action, nor frost action seem to offer satisfactory media for burying the

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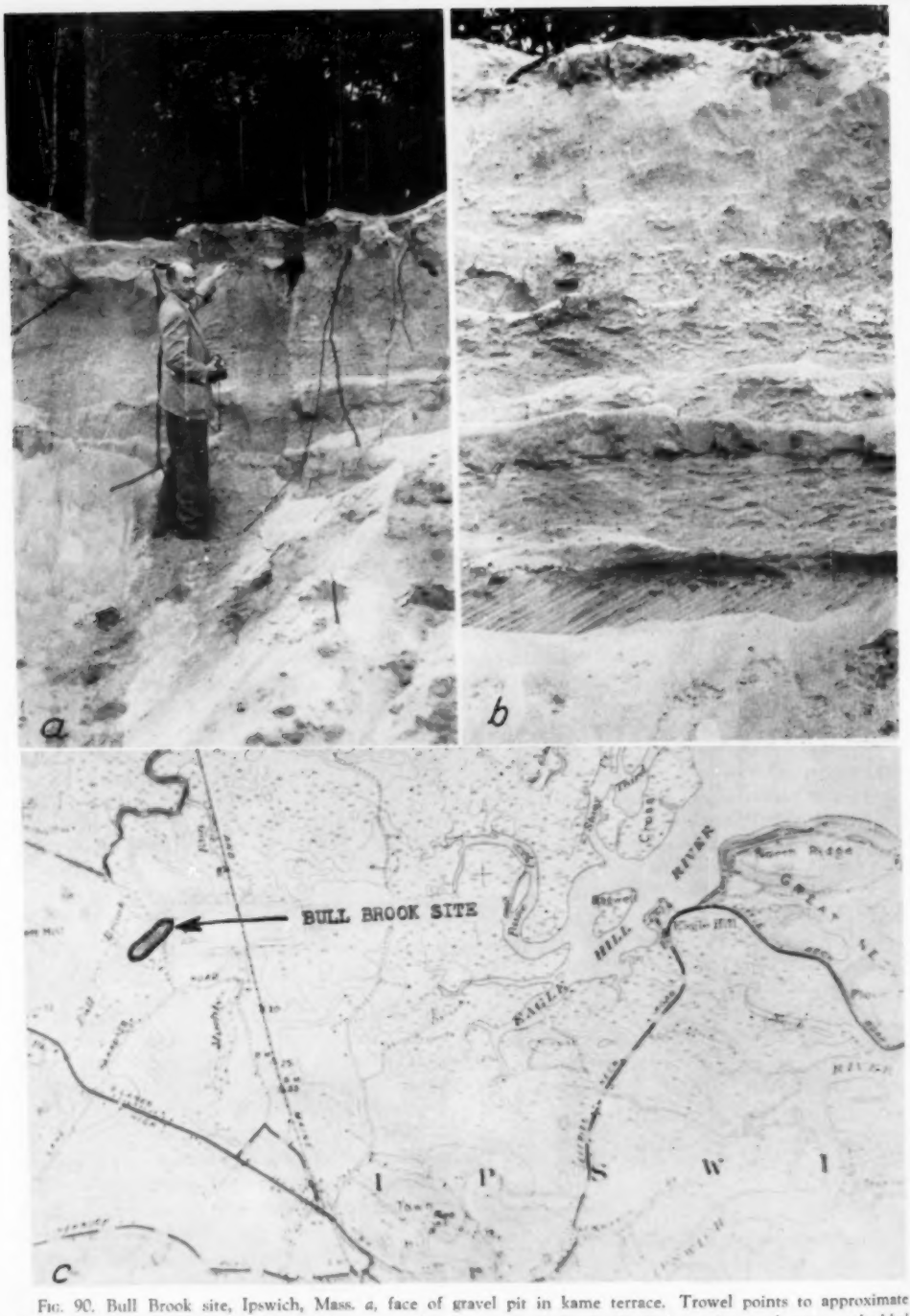

Fig. 90. Bull Brook site, Ipswich, Mass. *a*, face of gravel pit in kame terrace. Trowel points to approximate level at which implements of fluted point complex were found; *b*, detail of face of cut, showing unbedded layer of congeliturbate resting on cross-bedded sands below; *c*, portion of Ipswich Quandrangle, 7½ minute series, edition 1945, showing site (encircled by heavy line) on kame terrace.

objects. The matter remains a puzzle until further study may uncover new evidence.

The character of the implements which have been recovered — and there are close to 1000 of them, of which more than fifty are fluted points and fragments — strongly suggests the Enterline Chert industry, identified by Witthoft (1952). The material from which the implements were made is not definitely identified. It does not resemble western Onondaga chert. Charles Wray has examined some chips megascopically, and has identified them tentatively as including Deepkill flint from the Coxakie quarry, Little Falls dolomite, and Pennsylvania jasper from the Vera Cruz quarry. By the same technique, Witthoft has identified Pennsylvania jasper. Other stones look very much like occasional stones seen in collections from northern Maine. Some material may be local although no source for any of the material used for implements of the fluted point complex has yet been located. It is obvious that microscopic petrographic study is needed to prove identifications. If they are proved, it is obvious that we shall have to alter our ideas about our paleo-Indian, and his knowledge of the peoples and resources of the continent.

This paper, and interpretation, is based upon my work with a sample of the collection. The sample is probably representative of the entire collection, except that certain minority forms may be absent from it. I should like to express by appreciation of this courtesy on the part of the several owners of the artifacts. I would also like to thank Frank H. H. Roberts, Jr., Waldo R. Wedel, John Witthoft, and Ben C. McCary for the time and patience they have shown me, and to absolve them from any blame for statements about the collections which they have allowed me to examine.

In the Bull Brook sample, fluted points are represented by 35 pieces of which 5 are complete examples. Three more have some anomaly, 4 are finished basal portions, 5 are incompletely finished, and 18 are fragments of tips or midsections. They are remarkably uniform in size, ranging from 68-49 mm. in length, by 25-21 mm. in width. Unfluted parts show a rather thick lozenge-shaped cross section. Shape is not uniform, but the tendency is toward parallel sides aft of the midpoint, with a gradually tapering tip, rather than a broad bluntly tapered tip. In this respect the Bull Brook points resemble the Clovis points found with the Naco elephant. Very slight narrowing toward the base is shown on two fragments (Fig. 91, *n*). Although "ears" are well formed on some of the basal fragments they do not approach the needle-sharp "ears" on Lindenmeier specimens, nor is the basal concavity squared out or symmetrically finished. This is true of fluted points from the three eastern sites here considered — Williamson, Shoop, and Bull Brook. Evidence of smoothing of edges on sides and base is clear.

I have not been able to identify any unfinished fragments from tips of points among specimens from either the Bull Brook or Williamson sites. Several Lindenmeier pieces show that fluted points were made from large lamellar flakes and that the bulbar end of the original flake was to be the tip of the projectile. The distal end of such flakes may carry a portion of the tabular surface of the block from which it was struck. This surface, somewhat beveled with respect to the long axis of the flake, would serve as a striking platform for the removal of preliminary chips to isolate the flute. There is a possibility that the longitudinal chips parallel to, and seen on either side of, the flute scar on some Lindenmeier pieces were removed before the central flute was struck off. If so, there is no fundamental difference between the fluting processes used by the Lindenmeier and Enterline industries. This does not preclude the possibility that the side flutes on the Lindenmeier points were made by later trimming. The central tit was not present on all the Lindenmeier points that I examined. Some Lindenmeier points show multiple flute scars; most Enterline points that I have seen do not show long lateral flutes, but only scars of short chips. It should be emphasized again that I have not seen the entire collection on which Witthoft based his study. Undoubtedly the main flute erased much evidence of preliminary flaking.

In the Bull Brook series we have samples which seem to show that the steps in fluting were:

1) Preparation of the base, when necessary, by preparing a beveled striking platform (Fig. 91, *a*).

2) Removal of two chips on either side of the center to isolate the flute (Fig. 91, *b*, the right-hand chip "ran" to spoil the piece).

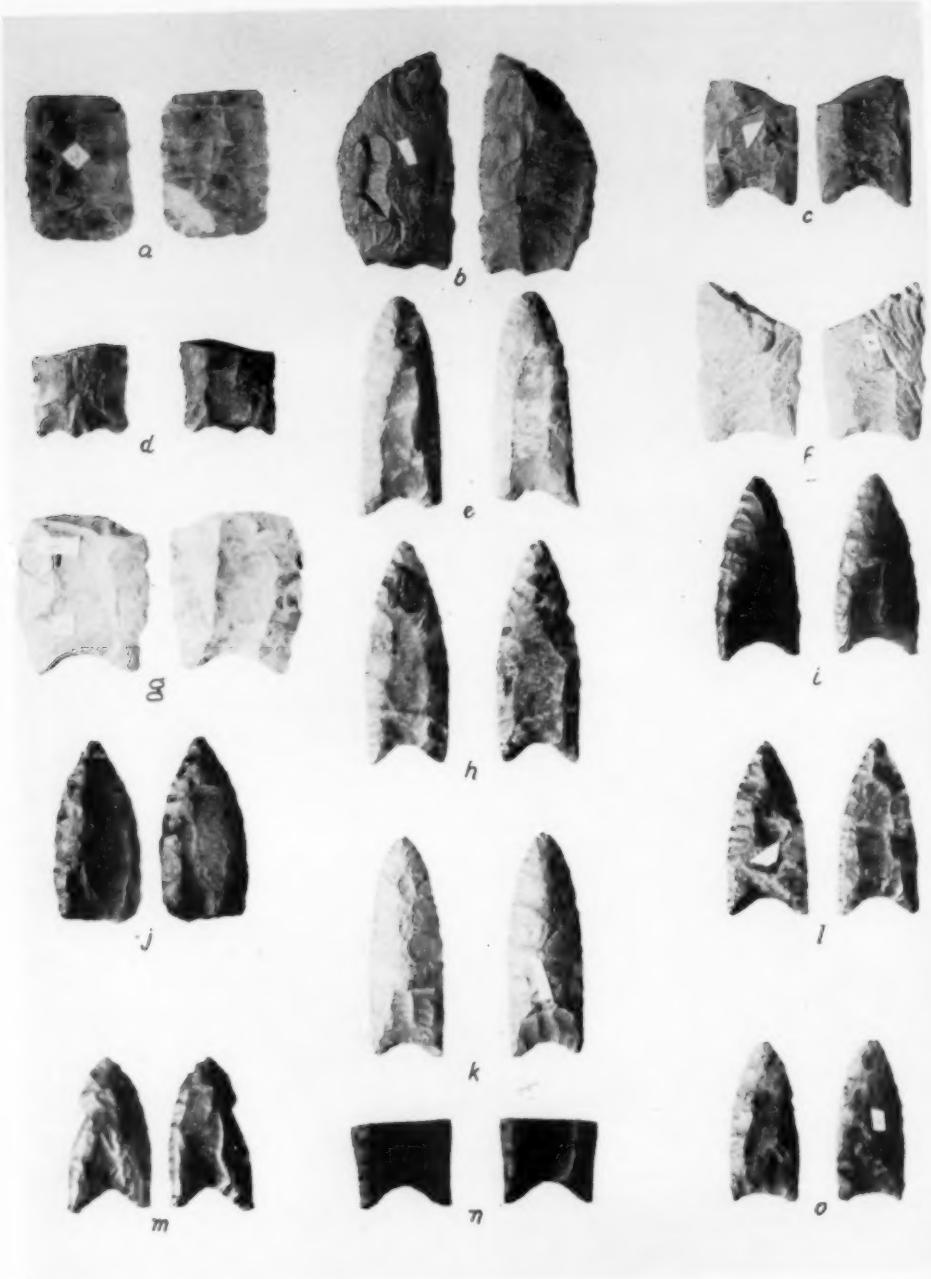

FIG. 91. Fluted points and fragments, from the Bull Brook site, Ipswich, Mass. (All one-half natural size.)

3) Removal of the flute from one face (Fig. 91, *d*).

4) Beveling of the base to prepare a new striking platform.

5) Removal of the flute from the other face, not always preceded by removal of preliminary chips.

Many specimens show that the base of the flute was retouched to effect a bevel on one side, but that on the other side the flute scar runs straight to the base without retouch (Fig. 91, *e*, *h*, *l*, the less retouched side being to the right). On these, the side which lacks evidence of retouch appears to be the last from which the flake was removed. In this respect some Lindenmeier specimens, the Shoop, and the Williamson points resemble points from Bull Brook. Some specimens from eastern sites show retouch on both fluted faces.

After reading the above discussion of the fluting technique, Witthoft (personal communication) makes the following comments:

> One specimen at Shoop's has the beveled scraper-like striking platform; this specimen is of Normanskill chert, has an outline quite distinct from that of any other base at the site, and shows no evidence of multiple fluting. The other Shoop blanks show a thick wedge-shaped base, not beveled, with multiple fluting from this thick blunt edge (Pl. 2, Nos. 2 and 6 are almost ideal examples). The blanks and finished points, except for the single aberrant Normanskill specimen, do not show beveling of the base. Pl. 2, No. 9 is not beveled but is chipped to symmetry.
>
> I am not impressed by the multiple fluting at Lindenmeier. It is unusual, and I believe the side flutes are later than the central ones rather than earlier; they were trimming flakes. This could be determined by careful inspection of Roberts' series, and my statement is an impression rather than a good determination.
>
> I think we have three types of fluting which are distinct although they are not completely mutually exclusive at the sites; one or the other predominates, however:
>
> 1. Multiple fluting from a wedge-shaped, symmetrical base, lateral flutes struck before the central flake, with the final retouched product a shallow paraboloid basal outline: generally produced medium long, concave flutes.
>
> 2. Single or double fluting from a beveled, scraper-like, asymetrical base, with the final outline of the basal edge an arc of an oval or sometimes a high paraboloid. This I think of as the Clovis procedure, and it sometimes produced the longest, most concave, narrowest flutes.
>
> 3. Single, broad fluting of a type most like splitting from a retouched and isolated shaped tit of a striking platform, often associated with considerable secondary basal thinning and shaping. The end product generally is a basal outline approximating an arc of a circle. Flutes in ideal execution are broad, long, nonrippled, and their cross-sectional concavity is of larger radius than the other two forms.
>
> Intergrades between these must exist. I believe these distinctions are valid, but there is a very great need for independent interpretation of these features by other people, because this whole business is very sticky. I hope you can throw light on this one way or another from the [complete] Bull Brook series.

Fine parallel retouching such as is found on the Lindenmeier points is not found on any point from the east that I have examined, although it was used on one of the fluted points from Wisconsin which I reported (Byers, 1942) some years ago. Perhaps the quality of the stone which was used may have some bearing on the character of the retouch. At any rate, the Bull Brook, Williamson, and Shoop points that I have seen seem to equate with Lindenmeier points in the next to final stage of manufacture.

Needlelike uniface gravers, sometimes with more than one point, are found in the sample from Bull Brook (Fig. 92, *c*). It includes 26 single tipped ones and 4 with two or more tips. They are even more delicate than many of those from Lindenmeier. Seven good examples of gravers are known from the Shoop site, and many more in damaged condition have been found. No gravers had been found at the Williamson site up to the time of my examination of the collection. Chisel gravers are known only from Lindenmeier.

End scrapers, the snub-nosed variety, are made from a rather thick flake. Witthoft has determined that the examples of this tool found at the Shoop site were made from short, thick blades, and has been able to identify the bulb of percussion at the proximal or "handle" end of the tool. Although there are no clear-cut examples of the bulb of percussion among our Bull Brook samples, it seems quite likely that blanks for this form of tool were similarly derived by people in New England and Pennsylvania. Because of variations in the form of the original blank, cross sections of finished scrapers vary from flattish, with a somewhat concave top, through ridged to peaked. Usu-

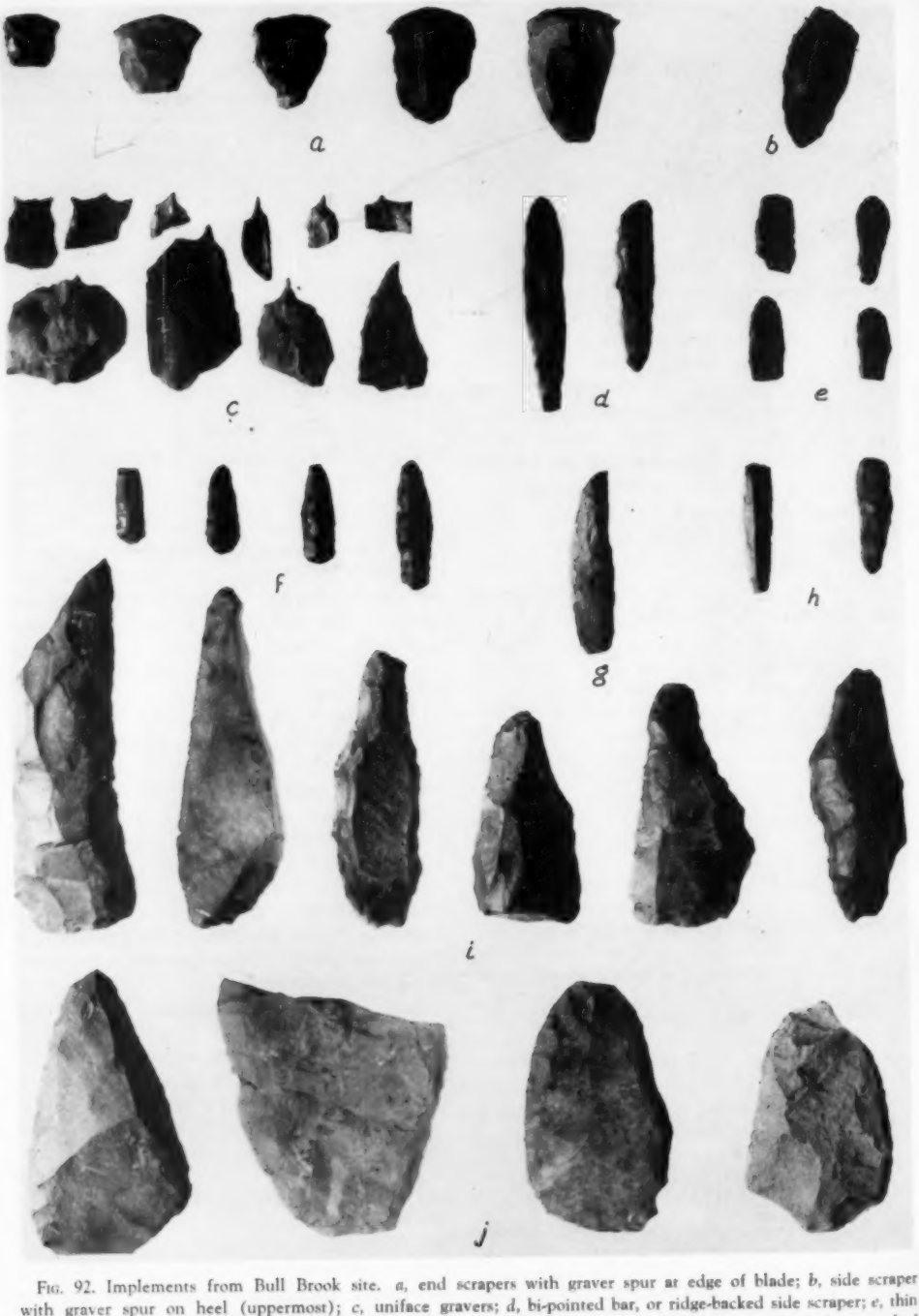

FIG. 92. Implements from Bull Brook site. *a*, end scrapers with graver spur at edge of blade; *b*, side scraper with graver spur on heel (uppermost); *c*, uniface gravers; *d*, bi-pointed bar, or ridge-backed side scraper; *e*, thin side scrapers made from retouched blade; *f*, "twist drills"; *g*, blade retouched to a perforator point; *h*, retouched blades; *i*, Enterline side scrapers; *j*, broad, flat side scrapers. (All one-half natural size.)

ally the underside is flat, but a few are curved because the blade from which they were made is, itself, curved longitudinally. By far the most common form is that which approximates the trapezoid to trianguloid in plan, with a rather straight working edge. All forms, including the peaked, ridged, and flat, in both short and long variations are found in all collections. Graver spurs appear characteristically on the outer ends of the cutting edge of the trapezoid to trianguloid scrapers (Fig. 92, *a*). Were it not for differences in stone, scrapers from Lindenmeier, Bull Brook, Shoop, and Williamson could hardly be differentiated. There are, however, small differences as regards detail of manufacture which may prove significant.

Witthoft has described the Enterline side scraper as a beaked implement with the bulbar end of the flake at the tip. On only one specimen of the 10 from Bull Brook can I be positive that the bulbar end is at the tip. Otherwise the implements from Bull Brook are typical Enterline side scrapers (Fig. 92, *i*). These are not known from Lindenmeier, where side scrapers appear to be worked on almost any suitable flake. Another form of side scraper is one with an outline which, in its best examples, shows marked similarity to the outline of the human ear. It is made from a large, rather thin flake which is chipped from the flat side only (Fig. 92, *j*). It is sometimes difficult to tell the difference between the less finished examples of this form and spalls which have been edged up and utilized. This is characteristic of all four sites. A very peculiar form of side scraper is the very narrow bi-pointed bar, or ridge-backed form that is deeper than it is broad (Fig. 92, *d*). This is a minority form that occurs at Lindenmeier, Bull Brook, and the Williamson site. A narrow flat form, which occurs at Bull Brook and Williamson only, appears to be a modified blade (Fig. 92, *e*). Graver spurs occur on the Enterline side scraper (Fig. 92, *b*), on the ear form, and on irregular spall side scrapers. None have been found on such scrapers from the Williamson site, so far as I know.

Spokeshaves, in effect side scrapers with a semicircular concavity in one side, have been found only at Lindenmeier. There are some slightly concaved working edges on retouched flakes from the other sites, but they are not in the same class with the deeply concave, well-defined spokeshaves from Lindenmeier. One spokeshave shaped implement from Bull Brook shows the effect of battering or hammering use, rather than scraping.

One category of tool not commonly believed to be associated with fluted point complexes is the drill. Lindenmeier has produced bilaterally and bifacially chipped drills which retain a portion of the original flake as an expanded end. These tools are quite distinct from large gravers or chisel gravers. At least one example is also known from the Williamson site, but none have yet been reported from the other two sites under consideration. There is another class of drill, called "twist drill" by the Bull Brook group because the sharpened end is very similar to that on an ordinary twist drill (Fig. 92, *f*). The shaft does not have an expanded base. This group of tools is known only from Bull Brook and the Williamson site.

Flake knives are known from all sites, although the number varies tremendously from site to site. Whereas fragments of bladelets, many carefully drawn, are very abundant at the Shoop site, such fragments seem to be far less common at Bull Brook. Utilized flakes of one form or another are found in the collections from each site. The technique of "shearing" the rim of a thin flake in order to prepare a working edge seems not to have been known to either the people who lived at the Shoop site, or those at the Williamson site.

Cores are known from Shoop's, Williamson's, and Bull Brook. It should be distinctly undertsood that these are not polyhedral cores such as are associated with core-and-blade industries of the Arctic, or with Mexican or Hopewell core-and-blade industry. Witthoft has described the cores from Shoop's as being reduced to such an extent that even small slivers could no longer be drawn from them. Heavy cores have been collected from the Williamson place, while two pieces from the Bull Brook site are also taken to be cores. The cores from the two latter places do not approach the cores from Shoop's in exhaustion.

Rubbed hematite was found at Lindenmeier, rubbed graphite, at Bull Brook. Hammerstones found at Bull Brook may belong to the fluted point horizon, but there is also a chance that they came from the neo-Indian horizon. Lindenmeier, alone, has yielded bone artifacts, rubbing stones, and whetstones for bone implements.

The remarkable similarity between the complexes at these four sites is cause for pause and

sober stocktaking. The duplication of work habits at such widely separated points can mean only one of two things: either people were extremely conservative in their work habits, or they spread much more rapidly than we have been willing to believe. Witthoft's argument about the priority of the Shoop site on the basis of the use of Onondaga chert alone is hard to answer. The sparse tool inventory at Shoop's would indicate either that other forms haven't been collected because they were broken by farm implements or were not recog-

TABLE 14.

A COMPARISON OF FLUTED POINT COMPLEXES

	BULL BROOK	LINDENMEIER	SHOOP	WILLIAMSON
FLUTED POINTS				
Outline				
Stubby		X		
Greatest Width Ahead of Midpoint		X		X
Parallel Sides	X	X	X	X
Sides Constricted Toward Base (Flaring Ears)	X	X	X	X
Gradually Tapering Point	X	X	X	X
Excurvate Sides with Tapering Point		X	X	X
Manufacture				
From Blade Struck from Core	?	X	X	?
Base Dressed To Beveled Striking Platform	X	X	X	?
Multiple Fluting	X	X	X	?
Lateral Chips or Flutes to Isolate Flute Flake	X	X	X	X
Base of Flute Lacks Retouch on one Side	X	SOME	X	X
Base of Flute Retouched Both Sides	SOME	X		
Finish by Fine Parallel Step Retouch		X		
Parallel Flaking on Blade	X	X		X
Base and Sides Rubbed	X	X	X	X
GRAVERS				
Unilaterally Chipped, 1 or More Tips	X	X	X	
Chisel Gravers		X		
DRILLS				
Bilaterally Chipped from Flake, Expanded Base		X		X
Bilaterally Chipped Twist Drills	X			X
END SCRAPERS				
Small Flat "Thumbnail", Trapezoidal-Oval	X	X	X	X
Peaked, Ridged, Trapezoidal	X	X	X	X
" " " , Elongate.	X	X	X	X
Flat Form with Rounded Bit,	X	X	X	X
Flat, Trapezoidal-Triangular, Straight Bit	X	X	X	X
Flat, Trapezoidal-Triangular, Straight Bit (Graver(s)	X	X	X	X
SIDE SCRAPERS				
Narrow Beaked Blade with Sharp Tip	X		X	X
Broad "Ear" Form	X	X	X	X
Irregular Spalls with Scraper Edge	X	X		X
Narrow Ridge-Backed Form	X	X		X
Narrow Flat Form	X			X
Graver Spur (On One of First Three Forms)	X	X	X	
BLADES				
Prismatic Flakes	X	X	X	X
Irregular Flakes		X		
UTILIZED FLAKES	X	X		X
FLAKES RETOUCHED BY "SHEARING"	X	X		?
RUBBED PIGMENT	GRAPHITE	HEMATITE		
RUBBING STONES		X		
HAMMER STONES	?	X		
CORES	X		X	X
BONE ARTIFACTS		X		

nized or that the inhabitants of the site had no use for them and didn't make them. Since every fragment and chip was collected from the Shoop site, it is evident that the absence of some forms is a factor of the site. Witthoft informs me that some forms found at Bull Brook, but missing at Shoop's are found at the Parrish site.

The really striking similarity between the Lindenmeier inventory and the Bull Brook inventory is perhaps deceptive. These are the only two sites under consideration in which the culture bearing layer hasn't been disturbed by farming. The resemblance between the Bull Brook fluted points and some of the Clovis points suggests a connection between Bull Brook and Clovis, but until a Clovis campsite is found it would be rash to make too many statements about cultural connections. Certainly there are differences between fluted points from the east as great as the differences between Clovis and Lindenmeier Folsom.

It will be noticed that I have omitted mention of the Reagan site in Vermont. This I have done because the similarities observable between forms from the Reagan site and those from Bull Brook and the other sites hold true only in the most general terms. Fluted points from Reagan have been illustrated by Ritchie (1953). One can see that the general form of the points, and particularly that of the base of the points, is quite distinct. The exception to this is found in his Figure 89, *10*, but even here the sides appear to contract markedly toward the base. While there are some end scrapers among the collections that duplicate forms of scrapers from the Reagan site, the characteristic trapezoidal form, and especially that with graver spurs, appears to be lacking. Other forms found in the Enterline chert industry, or present at Bull Brook and the Williamson site are also lacking there. Because of these absences, and because there are among the collection from the Reagan site many forms, such as the soapstone pendants, which are lacking from the other sites, it appears to me that the Reagan site belongs in a slightly different category although I do not question Ritchie's statement that it is related to the fluted point horizon.

This is intended solely as a preliminary notice of a site which has produced a tool complex that shows startling similarities to complexes present at the Lindenmeier, Shoop, and Williamson sites. Identity of forms among these sites is such as to argue strongly for cultural relationship among them. Other sites, such as the Parrish site, and the Quad site, from which we have as yet only the most fragmentary information, appear to be closely connected. As the extent of our knowledge grows it appears essential to modify earlier ideas concerning paleo-Indian occupation of the continent. Perhaps diligent search will uncover another site of the fluted point complex in the east at which careful and controlled excavation may be expected to yield information now lacking to us.

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Robert S. Peabody Foundation
Andover, Massachusetts
May, 1953

A PRELIMINARY STUDY OF SPACE AND TIME PERSPECTIVE IN NORTHERN COLOMBIA

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ALTHOUGH THE Republic of Colombia occupies a large area in northwestern South America and its geographical position makes it an important link between the basic components of nuclear America, our knowledge of Colombia's prehistoric cultures is still very scanty and sporadic. Practically no serious attempts have been made toward correlating its many different cultural manifestations in terms of temporal development or spatial distribution. This has been due mainly to the lack of organized scientific archaeology and to the romantic orientation most research had taken in Colombia, where archaeologists have concentrated upon the more spectacular ceremonial sites while ignoring almost completely the problems of chronology and cultural interrelations.

The considerable advance made during the last decade in the field of Venezuelan and Antillean archaeology, together with the many unsolved problems posed by Meso-American and South American relationships, has pressed the need for the establishment of an adequate chronological framework for the archaeological cultures of the north Colombian lowlands. The archaeological history of this area should be of great significance for the understanding of

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FIG. 93. Archaeological areas in northern Colombia.

cultural developments and relations, not only within the circum-Caribbean area but also in the neighboring regions.

In recent years the writer has had the opportunity of making a survey of the northern provinces of Colombia bordering the Caribbean seaboard and of investigating in some detail a number of archaeological sites, principally in the Department of Magdalena. This research has led to the tentative establishment of a general temporal framework. The present paper is intended to give a summary of the archaeological areas and cultural sequences as they have been postulated to date. It is necessary to state, however, that this research is still in its initial stages and that the validity of the provisional framework suggested here will necessarily have to be substantiated and the framework revised as field research advances.

With the exception of J. Alden Mason's (1931, 1936, 1939) extensive field work in the Tairona area in 1922-23, no systematic archaeological research had been accomplished in the Department of Magdalena nor in any other region of the Atlantic coast previous to 1946, when the writer and his wife began a survey followed by a series of excavations in selected sites (Reichel-Dolmatoff, 1951). Since 1950 this program has been continued in part by a small group of other Colombian archaeologists stationed in Barranquilla and Santa Marta. So far, the results of these investigations have been rather promising and have given an entirely new orientation to Colombian archaeology in general.

Geographically the Department of Magdalena can be subdivided into four major regions (Fig. 93): the arid coastal strip which extends west of the Guajira Peninsula, covering the flat country bordering the lower Ranchería River and parts of the coast to the south and east of the town of Santa Marta; the Sierra Nevada de Santa Marta, an isolated mountain mass which occupies most of the northern portion of the Department; the semiaquatic and slightly undulating lowlands to the south of the Sierra Nevada, neighboring the Magdalena River and its tributary, the Cesar; and the western slopes of the Sierra de Perijá, which in this part of the country forms the northernmost tip of the Andean system. All four regions are sharply differentiated by physiographic and climatic factors, offering habitats with distinctive ecological conditions which range from the sandy deserts of the Guajira Peninsula to the snow-capped peaks of the Sierra Nevada and the tropical jungle belt which surrounds the base of the Sierra. A considerable number of additional distinctive features might justify further subdivision into minor regions, but for the purpose of our cultural outline the four-fold division stated above can be considered fairly adequate.

On the basis of the archaeological remains observed in the course of our investigations, we have come to distinguish five archaeological areas, which correspond in a certain degree to the geographical regions of Figure 93. These areas are: Ranchería River, Cesar River, Lower Magdalena River, Sierra Nevada, and Littoral. In the following pages I shall discuss briefly these areas, their cultural characteristics, time perspective, spatial aspects, and possible relationships.

Ranchería River. This area covers the flat and arid country of the Ranchería River, between the northeastern foothills of the Sierra Nevada, the deserts of the Guajira Peninsula, and the western slopes of the Sierra de Perijá. Our cultural material comes from 22 of the 36 open sites which we visited. Altogether, we dug 7 stratigraphic test trenches and made 18 surface collections. The total of sherds alone amounts to some 80,000. All trenches were dug in midden sites or other accumulations of occupational debris, none of them deeper than about 2 meters; in three of the trenches a stratification of occupational levels was observed. Chronological sequences were defined by superposition and, in some cases, by typological comparisons. To designate the sequences in this and other areas, the names of type sites have been used (Reichel-Dolmatoff and Dussán de Reichel, 1951).

The earliest time level has been termed the Loma period. It is characterized by polychrome pottery and incised, smoked blackware, the outstanding decorative feature of which is the sigmoid scroll. There is also a white-slipped, rather coarse ware decorated with black or red designs similar to those observed in the polychrome ware. Culinary sherds are of a coarse brownish type. There is a considerable variety of rim forms, although vessel shapes seem to have been rather standardized. Annular bases and handles are absent. We obtained only a few nonceramic artifacts, such as fragments

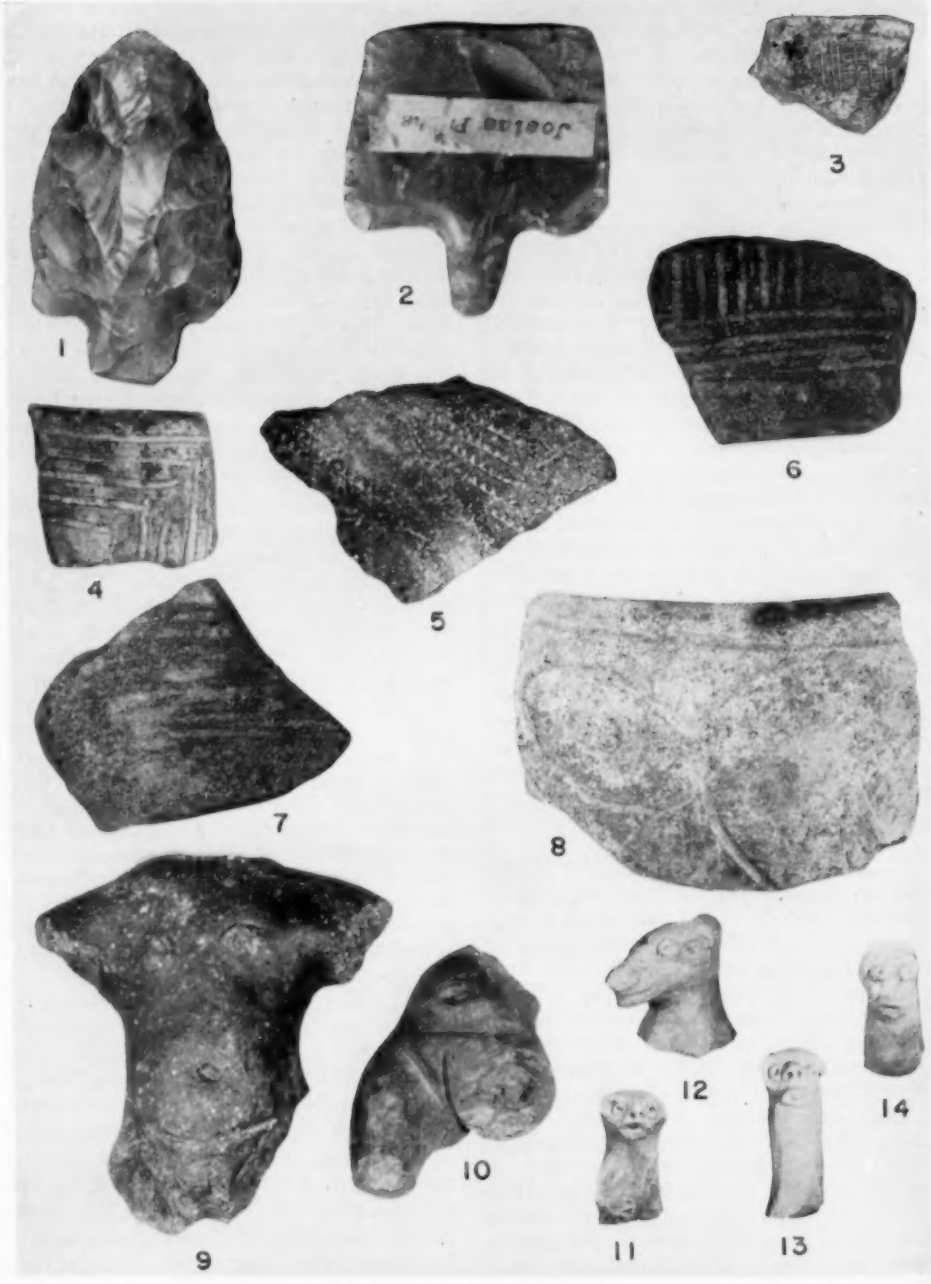

FIG. 94. Paleo-Indian, Formative and Archaic (?) materials. *1-2*, flint arrowheads; 3-8, Isla de los Indios; *9-14*, region of Santa Marta (scale varies).

FIG. 95. *1-4, 6, 8, 10,* La Mesa (sub-Tairona); *5, 7, 9, 11-15,* Pueblito (Tairona I) (scale varies).

of hammerstones and celts. No burials were recorded.

Overlying this culture is that of the Horno period, which has been subdivided into two developmental phases on typological grounds. The Horno period shows a further development of the Loma tradition, with a certain shift of emphasis from polychrome to bichrome types and new developments in the decorative features of the blackware. All types correspond closely to Loma wares, although the white-slipped type is missing here. In the upper levels the polychrome ware fades out while a new redware emerges from the basic culinary type. Annular bases and vertical strap handles are frequent in the upper levels. There is a great variety in rim types and considerable experimenting in modeled decoration. Small female clay figurines, which were already present during Loma times, develop fully in the Horno levels, which also contain a greater amount of nonceramic artifacts, such as small slate pendants, shell beads, and pottery discs. No burials were observed. As in the Loma period, the wide extension and thickness of the refuse deposits seem to indicate permanent settlements. While the Loma component is represented mainly by the type site, the Horno period is known from at least half a dozen sites spread over a considerable part of the valley.

After the Horno period there seems to be a considerable cleavage between horizons. For typological reasons the writer is inclined to believe that this gap was at least partially filled by the Cocos period, represented in the Ranchería area only by the type site but probably forming a broader transitional development. It is difficult to place the Cocos site satisfactorily in the sequence but certain ceramic similarities lead us to assume that it represents a development from the Horno period. A new white-slipped ware with black parallel-line designs makes its appearance and is the most characteristic feature of this culture. Nonceramic artifacts are very scarce; no burials were observed.

Following this level there appears an entirely new cultural tradition, represented by the Portacelli period (phases I and II). Although this may have certain ties with the Cocos period, it appears to form a well-defined new culture. Its most distinctive features are corrugated ware, fine black-on-red painted ware with ornithomorphic designs, and quite a different type of female figurines. Blackware is entirely missing and all incised decoration is confined to some rare specimens of the corrugated ware. Among the nonceramic artifacts, a number of nose rings (?) of shell can be mentioned. The two phases of development were distinguished on the basis of stylistic analysis and the presence or absence of certain traits. Corrugated pottery appears only in the more recent phase and may represent a trade ware. Several primary burials of adults with undoubted Portacelli associations were observed in refuse deposits of the Horno period. A series of isolated cylindrical burial urns might also be associated, if we can judge by similarities in rim sherds and painted decoration. The Portacelli focus includes at least ten sites in the whole area, the contemporaneity of which appears to be fairly certain. Its relatively recent chronological position, with regard to the Loma and Horno periods, seems to be proved beyond reasonable doubt by superposition.

Cesar River. This area, situated south of the Ranchería, covers the upper drainage of the Cesar River (Fig. 93). The lower foothills of the eastern slopes of the Sierra Nevada and part of the western slopes of the neighboring Sierra de Perijá probably should be included. The cultural material comes from five stratigraphical cuts, one burial cave, and three surface collections. The total of sherds is approximately 25,000.

The earliest, La Paz period has been postulated from the cultural remains observed in a burial cave, which contained some 120 cremated skeletons, a number of well-preserved pottery vessels, and a series of artifacts of stone, bone, and wood (Reichel-Dolmatoff, 1949). The dominant pottery is a white-on-red resist negative ware associated with stone palettes, spear throwers, and miscellaneous stone implements of utilitarian character. From ceramic typology it may be suggested that this material forms part of an early horizon preceding the Loma-Horno sequence but this is, of course, open to verification by stratigraphic evidence. So far, we know of only one small La Paz-type sherd found in Loma association (Reichel-Dolmatoff and Dussán de Reichel, 1951, p. 91).

The so-called Hatico period seems to cover a considerable time span and does not appear to have any relation to the preceding (?) La Paz material. Hatico pottery is decorated by inci-

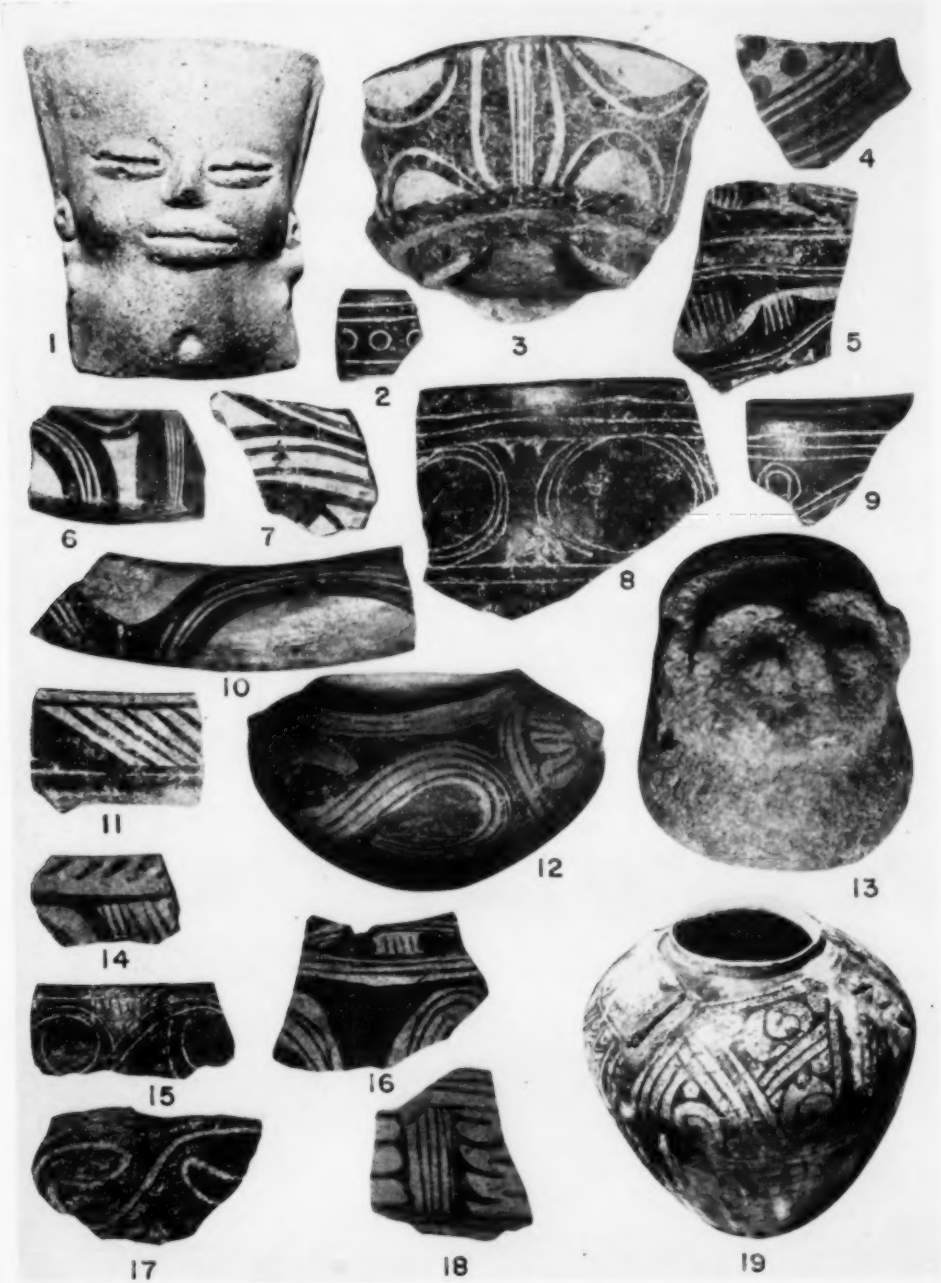

FIG. 96. First Painted Horizon. *1-10*, El Horno; *11-18*, La Loma; 19, Mompós (scale varies).

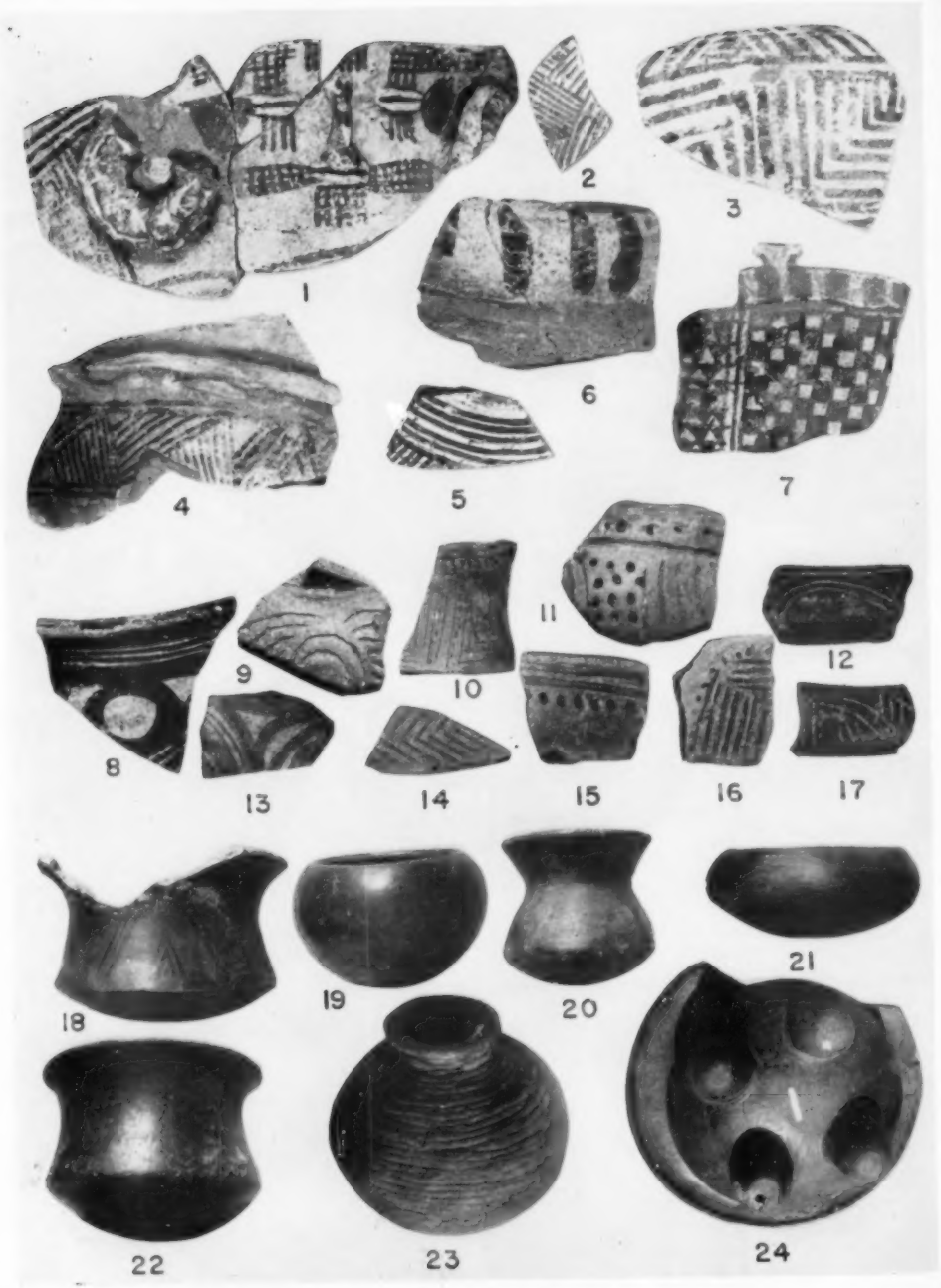

FIG. 97. *1-7*, Los Cocos (Second Painted Horizon); *8-17*, El Hatico (Second Painted Horizon); *18-24*, La Paz (scale varies).

sion, both reduced firing and oxidized wares being present. As a whole, this seems to be a local development derived from a southern tradition seen in the Saloa Incised wares of the Lower Magdalena area. Many decorative elements, such as the developing variants of the sigmoid scroll and the appearance of some sherds closely related to Horno painted wares, suggests contemporaneity of the Hatico and Loma-Horno sequences.

Overlying the Hatico remains there appears modified Portacelli material, probably representing a later development of the full Portacelli II phase of the Ranchería River. Occasional trade sherds from the Saloa complex from the Lower Magdalena area are found here. Urn burial in plain, ovoid-shaped vessels was probably practised during the latter part of the Hatico period.

The validity of the Cesar River area is evidently open to further verification and ultimately we might come to consider it as a peripheral complex which combines characteristics of both the Ranchería and the Lower Magdalena areas. Although it forms in certain ways a unit apart, it is not quite a clear-cut cultural area.

Lower Magdalena River. This area covers a very extensive region between the "panhandle" in the southern tip of the Department and the mouth of the Magdalena River (Fig. 93). Part of the lower Cesar River and the region bordering the Laguna de Zapatosa are included here. So far we know only a small section of the area, limited mainly to the southern portion of the Department, but sporadic finds indicate its wide range. There are at least 50 known sites in the southern part of the area. Our cultural material comes from three stratigraphic trenches, two extensive burial grounds, four surface collections, and a number of sporadic finds. The total of sherds examined so far amounts to some 42,000. All accumulations of occupational debris were found to be very shallow, from 50 to 75 cm., although they are widespread and very rich in cultural remains. The chronological position of the different time levels was established by taking a Spanish-contact site as point of departure, by cross-dating, and by typology.

The earliest period seems to be represented by a surface collection from a small island near the eastern shore of the Laguna de Zapatosa called Isla de los Indios, which lies below water level most of the year. It is characterized by thick-walled, straight-rimmed vessels with coarse sand temper, decorated by rocker-stamping or broad, shallow incision. This would indicate a formative horizon, the nature and extent of which we still know very little. Nevertheless, there is some evidence, acquired during the course of our survey, which seems to indicate that it has a broad distribution in northern Colombia and which may ultimately lead to the definition of a rather homogeneous cultural horizon. In addition to the type site, similar materials were found in surface collections from the eastern banks of the Magdalena River, some sites in the lowlands south of the Sierra Nevada, from the country surrounding Santa Marta, and from several sites near the mouth of the Magdalena River.

This horizon is succeeded by a great time gap, from which we have at present only a few scattered finds of painted pottery. Following the gap is the Saloa I period, a quite recent time level just antedating the Spanish conquest. The main traits of this period are yellowish or reddish wares; deeply incised decoration with parallel-hatched or herringbone designs; combinations of incised and punctate patterns; grater-bowls; a large variety of rim types; and a very characteristic decorative mode consisting of the application of small, flattened clay pellets, each provided with a diagonal notch which makes it appear like an "eye." Annular-based vessels are common. Only one ware, the least frequent, shows small, red-slipped cups with high annular bases, decorated with linear designs painted in black, and with modeled frog-motives near the rim. This ware seems to represent a final, clearly degenerative development of the Portacelli black-on-red cups with bird designs. The chronological contemporaneity of urn burials was established through their association with Saloa I wares. Burial urns consist of large cylindrical containers provided with a lid, upon which an anthropomorphic bust is modeled. All urns were found in groups, in L-shaped tombs (Reichel-Dolmatoff and Dussán de Reichel, 1943).

The Saloa II period is represented by a Spanish-contact site and surface collections from sites 50 kilometers south of the first. Some changes in form and decoration are readily discernible. Cylindrical carved stamps are frequent, as also are small clay spindle whorls

FIG. 98. Second Painted Horizon. *1-10*, Portacelli (scale varies).

and several types of celts and adzes. Pure hammered gold seems to have been common in both Saloa periods, and in Saloa II there is also evidence for the use of copper ornaments.

Sierra Nevada. This area covers the isolated mountain mass situated in the northern portion of the Department of Magdalena (Fig. 93). It includes some of the beaches to the east and south of Santa Marta, but is otherwise limited to the foothills and mountain slopes, reaching occasionally up to more than 2,000 meters altitude above sea level. There are several hundred known sites, some of them of great extension and covering many square kilometers of terrain. The cultural material which was used for typological and chronological analysis comes from some 30 house sites, 3 ceremonial house sites, 6 rock-crevices, 3 major burial grounds, and some 25 surface collections. Many sites contained well-preserved pottery; the sherd material reaches nearly 80,000 specimens.

This area is by far the most complicated and problematic one. While the recent time levels are represented by a highly developed culture, the older levels seem to show a great cultural diversity. The establishment of an approximate time scale proved to be difficult because of the apparent lack of cultural deposits deep enough for stratigraphic analysis. As a matter of fact, the common house sites contain cultural strata of hardly more than 25 cm., while most refuse was thrown into deep and narrow crevices in the rocks, a practice which makes systematic excavation nearly impossible. A tentative chronological sequence was postulated by working back from Spanish-contact sites, by horizontal comparisons of typological series, and by occasional cross-dating.

On the early time level, all data are highly speculative. A paleo-Indian horizon is suggested by some flint points found occasionally and without controlled associations. So far there is no evidence for a later pre- or nonceramic horizon, and only little evidence for a formative stage, represented in this area by sporadic surface finds of a type similar to the Isla de los Indios material (see the Cesar River area, discussion).

There exist several foci of cultural materials which could possibly be interpreted as archaic in type, preceding the formative, although the question whether we are dealing here with distinct cultures or only with limited ceramic complexes will be open to discussion until more work has been done in this area. The main characteristics are very crude, female clay figurines; clay pestles; coarse, sand-tempered redware; biomorphic lug-handles; and some objects of shell.

As in the Lower Magdalena area, these materials seem to be separated from the recent cultural levels by a broad time span, bridged only by scattered finds of painted pottery. The discovery of a number of house sites containing Spanish contact material has served as a basis for the establishment of a typological series corresponding to the early (?) sixteenth century. By comparison of this series with the one obtained from noncontact sites and rock-crevices, it has been possible to establish an earlier time level and to suggest a tentative sequence of two periods. These have been termed Tairona I and II, after the sixteenth-century tribe which occupied part of the area.

Tairona II is by no means degenerate but marks the cultural climax, while Tairona I can be distinguished as an earlier level. The main characteristics of Tairona II are megalithic domestic and ceremonial architecture, agricultural terraces, redware and smoked blackware, the absence of all painted decoration and emphasis upon modeled biomorphic designs, tubular necklace beads of highly polished quartz, tetrapod vessels, monolithic axes, wing-shaped stone ornaments, ornaments of gold, gilded copper or "tumbaga," biomorphic clay whistles of excellent craftsmanship, etc.

Tairona I is characterized by a far less developed domestic architecture and a general lack of emphasis upon ceremonialism, the whole complex of monolithic axes, stone maces, and wing-shaped ornaments being absent. Although the basic red- and blackwares are already present, they differ in surface finish and an additional type is represented by brown-slipped storage vessels. Characteristic shapes include redware cups with inverted rims, concave-based blackware jars, ring-shaped vessels in form of coiled reptiles, and large shallow trays with loop handles. Short conical pestles of coarse clay occur frequently as do ladles with cylindrical handles, which are often biomorphic. Among the distinctive minor traits are a modeled frog motive; round instead of coffee-bean eyes; and large, oval depressions covering the upper part of the red- and brownware storage vessels, at the base of the neck.

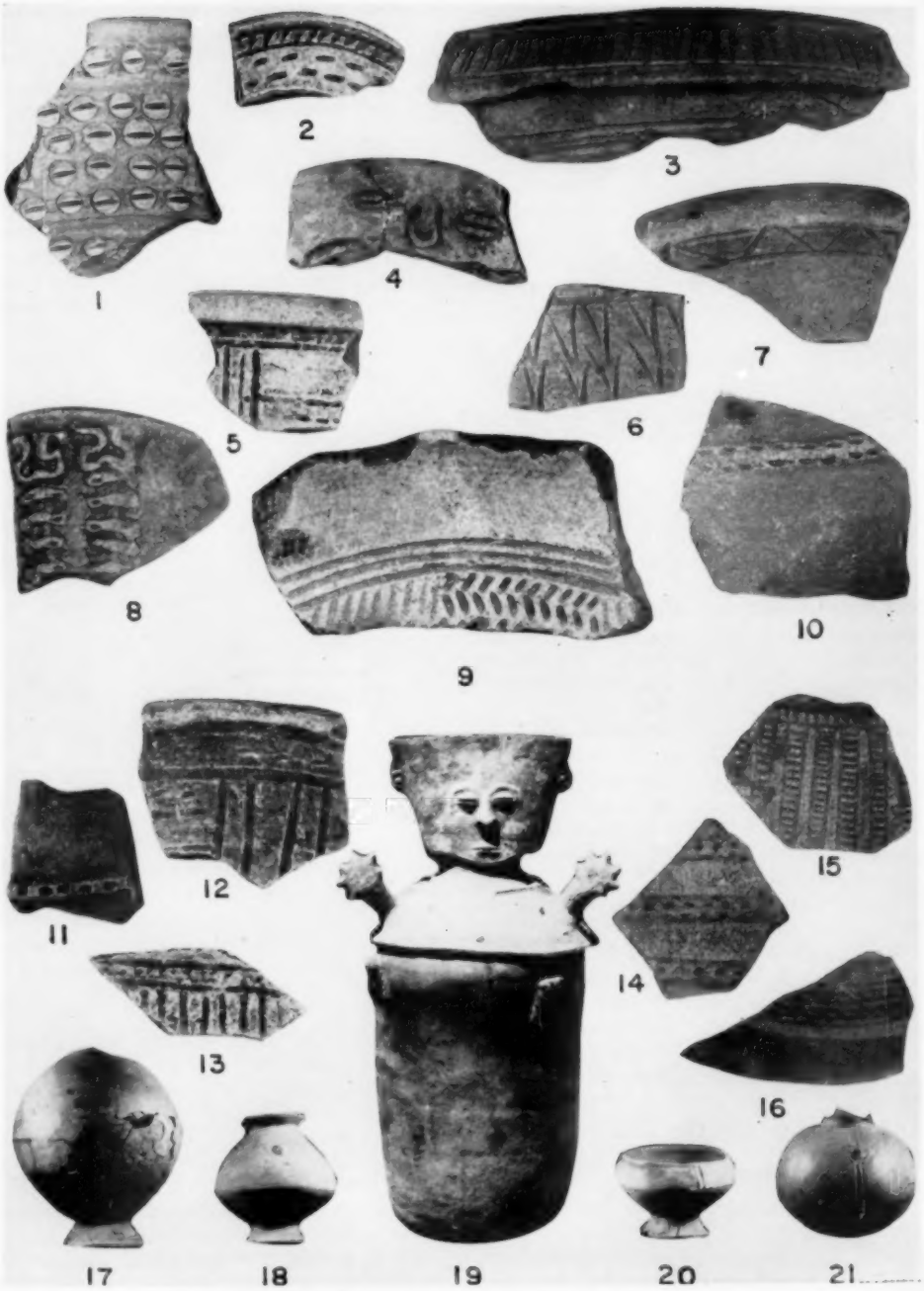

FIG. 99. *1-10*, Saloa II; *11-16*, Saloa I; *19*, Tamalameque; *17, 18, 20, 21*, Costa de Salamanca (scale varies).

FIG. 100. *1-24*, Tairona II (scale varies).

There are at least two types of burial, stone cists and anthropomorphic or plain ovoid urns, probably representing different time levels.

The identification of deeper levels which might link Tairona I with the earlier cultures is one of the main problems awaiting solution in this area. On the southern and eastern slopes a new focus was observed which typologically seems to be ancestral to Tairona I and which we have tentatively designated sub-Tairona. However, the chronological position of this focus is highly problematic. The presence of readily identifiable sherds of Portacelli II wares in the sites of this focus, and the intrusion of some sub-Tairona materials into the latest Portacelli developments of the Cesar area, indicate contemporaneity, and in addition, many characteristics of the suggested sub-Tairona period seem to be ancestral forms of Tairona I traits. Nevertheless, it is possible that this may instead be a local development parelleling to some degree the Tairona I and II phases. The postulated sub-Tairona period is characterized by urn burial in anthropomorphic, ovoid-shaped vessels with a human face modeled on the wall of the container; red-and-blackwares with poorly controlled firing; female figurines (one of them sitting upon a four-legged stool); pure, hammered gold ornaments; spindle whorls; and necklace beads, the latter of Tairona I or II type. Recent excavations in the Río Seco drainage seem to make possible a subdivision of this period into smaller chronological units, based upon seriation of grave associations.

Littoral. This area covers the narrow strip of arid coastal plains south of Santa Marta; the Costa de Salamanca, which separates the Ciénaga Grande from the open sea; and some of the beaches and surrounding flat country east of Santa Marta (Fig. 93). There is some evidence of a possible extension onto the Guajira Peninsula and, towards the west, over the coastal plains of the Departments of Atlántico and Córdoba. There are some 30 open sites, mostly shell mounds and middens. All cultural materials considered here are those from surface collections. The total of sherds amounts to some 10,000. The main characteristics of this area are large accumulations of sea shells mixed with sherds and occasional artifacts of bone, stone, and metal (copper and gold). There is no evidence of permanent village sites but rather of temporary fishing camps. Although Tairona I and II type pottery occurs frequently in association, the Littoral area is characterized by a different ceramic complex consisting of yellowish, rose-colored, or grayish wares, the occasional use of shell temper, and the considerable hardness of all wares as compared with the Sierra Nevada materials. Stonehammers and scrapers are common, as are also small necklace beads made from different-colored clay or from shell. It is apparent that some of these materials are contemporary with Tairona II, but on the other hand a considerable time depth is suggested by deep and extensive accumulations of refuse. A seriation of recent materials was established by cross-dating with the Tairona wares.

Conclusions

The five archaeological areas we have dealt with in the foregoing summary, can be partly correlated by overlapping horizons or cross-dating. An approximate correlation is outlined in Table 15 which shows the five corresponding columns with their proposed sequences. Beginning with the earliest time level and taking into account the sporadic data on flint implements, it seems possible to suggest a paleo-Indian horizon common to all five areas. As far as truly archaic pottery is concerned, our data are just as scanty. On a formative level we have mentioned some materials from at least two areas (Lower Magdalena and Sierra Nevada).

As to the earlier painted wares, represented by the Loma-Horno sequence in the Ranchería River area, the writer is inclined to believe that they once had a very considerable range and that they form a true horizon. From typological evidence derived from occasional finds, they spread over a wide region, possibly from Venezuela to Panama. In the Lower Magdalena area this horizon seems to be represented by the polychrome burial urns found in the vicinity of Mompós and by some superficial sherds from the region of Plato. In the Sierra Nevada they reached the area of Pueblo Bello on the southern slopes and in the arid country surrounding Santa Marta they may be identified with certain painted sherds from the region of Mamatoco. In the area of the Cesar River, closely similar materials come from a surface site in the western foothills of the Sierra de Perijá, in the vicinity of the Laguna de Zapatosa.

The second painted horizon (if one may call it so) is represented by the Cocos and Portacelli

wares and also seems to have had a wide distribution, as far as we can judge from intrusive sherds found here and there in the neighboring areas. This horizon, it is felt, can be equated in time with another wide horizon of incised wares, both occupying a recent position.

It is possible that certain types of burial urns might have a chronological significance and it is probable that the ovoid plain type and the anthropomorphic types are representative of different time levels. The more realistic anthropomorphic urns seem to be quite recent and the writer is inclined to consider the so-called "Mosquito" urns, the Tamalameque urns, and the Sinú urns as belonging to one time level (cf. Bennett, 1944, pp. 78-9, 89-91, Table 9).

It is tempting to try to suggest certain correlations with broader cultural configurations and to link our framework with some of the Venezuelan and Panamanian developments, but such an attempt would be very speculative in the present state of our knowledge of northern Colombian archaeology. So far, all investigations have had mainly the character of a general survey and only the barest outline of cultural development can be presented here. The archaeological history of the interior provinces of Colombia is, of course, much too little known to permit any valid correlations or generalizations. However, it is probable that in the near future such a wider correlation might be attempted with a better claim for validity than can be done at the present.

TABLE 15

<table>
<tr><th>Postulated Horizons</th><th>Rancheria</th><th>Cesar</th><th>Lower Magdalena</th><th>Sierra Nevada</th><th>Littoral</th></tr>
<tr><td rowspan="3">None</td><td rowspan="3">?</td><td>?</td><td>Saloa II</td><td>Tairona II</td><td>Salamanca</td></tr>
<tr><td>Saloa I</td><td>Saloa I</td><td>Tairona I</td><td rowspan="6"></td></tr>
<tr><td>Portacelli III</td><td rowspan="5">?</td><td rowspan="3">Sub-Tairona (?)</td></tr>
<tr><td>Second Painted</td><td>Portacelli II</td><td rowspan="4">Hatico</td></tr>
<tr><td>Second Painted</td><td>Portacelli I</td></tr>
<tr><td>Second Painted</td><td>Cocos (?)</td></tr>
<tr><td rowspan="3">First Painted</td><td>Horno II</td><td rowspan="2">?</td><td rowspan="2">?</td></tr>
<tr><td>First Painted</td><td>Horno I</td></tr>
<tr><td>First Painted</td><td>Loma</td><td>?</td><td>Mompós (?)</td><td>Mamatoco (?)</td><td>?</td></tr>
<tr><td>Formative</td><td rowspan="3">?</td><td>La Paz (?)</td><td colspan="2">?</td><td rowspan="3"></td></tr>
<tr><td>Archaic</td><td rowspan="2">?</td><td colspan="2">Isla de los Indios</td></tr>
<tr><td>Paleo-Indian</td><td colspan="2">?</td></tr>
</table>

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Instituto Colombiano de Antropología
Bogotá, Colombia, S.A.
July, 1953

THE PALEO-ESKIMO CULTURE OF NORTHEAST GREENLAND ELUCIDATED BY THREE NEW SITES

EIGIL KNUTH

PRINSESSE INGEBORG HALVØ is a low peninsula, situated on lat. 81°35′N., long. 16°35′W. in northernmost east-Greenland. From the west it wedges into the large local icecap Flade Isblink, which forms the easternmost corner of Greenland. The peninsula lies 70 miles southeast of the northernmost region in Greenland, Pearyland, separated from it by a bay, the joint mouth of two big fjords: Danmarks Fjord and Independence Fjord. The latter cuts its way westward from the Greenland Sea as the southern border of Pearyland (Fig. 101).

At three places on Prinsesse Ingeborg Halvø (Fig. 102, A, B, C) paleo-Eskimo flint implements were spotted by the author of this article during the summer of 1952. The localities were all situated at a height of 40-50 feet above sea level and at a distance of 370-810 yards from the present coastline. Thus, from a geological point of view they belonged to the same horizon in the system of old raised beach terraces of the peninsula. In a similar way, however, they contrasted with the terrace level and appeared as isolated ridges in the terrain, visible at a great distance both across the flat land and from the sea ice. The pebbles at these points had been pushed upwards to form irregular systems of mounds and hillocks, remarkable, also, because big round stones dominated the material of which they were built up, contrary to the conditions on the plane terraces.

One would at first be inclined to take these stone accumulations to be morainic formations and connect them with the adjacent icecap, which might have covered the low peninsula

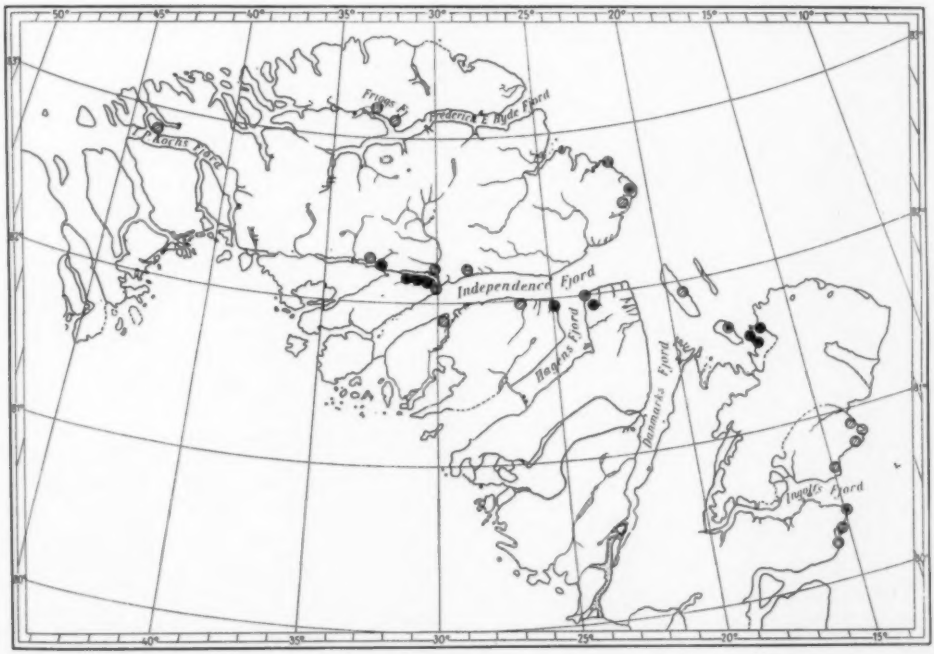

FIG. 101. Map of the Independence Fjord area. North of Independence Fjord: the Pearyland peninsula. East of Danmarks Fjord: Kronprins Christians Land with Prinsesse Ingeborg Halvø, marked by three black spots. (Solid circles are paleo-Eskimo sites; encircled dots are sites of whale-hunting culture; shaded circles are culturally unassigned.)

not long ago according to geologic chronology. Various observations, however, led to another explanation. Finds of a few fossil shells indicated a marine influence. Right at the base of the "stony islands" lay a gently sloping plane with driftwood, and with the appearance of an old beach. This could also be ascertained in conjunction with several other "stony islands" on the peninsula of the same character as A, B, C and with corresponding positions, roughly 40-50 feet above sea level and far from the coast. No flint implements were found on these other stone hills, but it was possible to trace the ancient shore terrace connecting them, as it here approached the present coastline, and there was distant from it more than one mile, in places where broad river valleys cut deep into the peninsula.

This horizon showed a much greater abundance of driftwood than any other, as indicated schematically in Figure 102. Where the terrace had preserved its firm stony surface, the driftwood lay scattered loosely over the pebbles, precisely as when it was washed ashore. Where the terrace receded from the beach, in the broad river basins, whose solifluction had effaced the terrace structure, the driftwood was found to be abundantly deposited in the clay, but the height above the present shoreline remained the same.

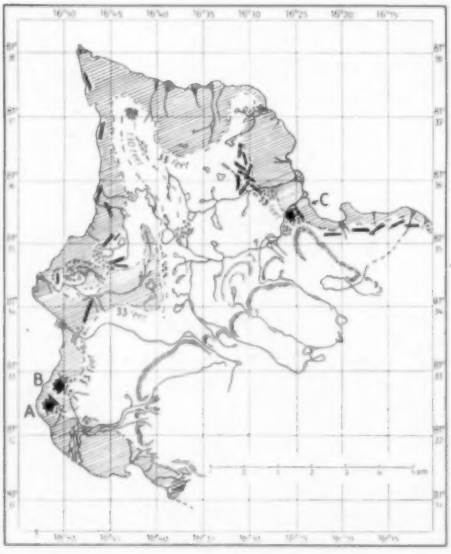

FIG. 102. Map of Prinsesse Ingeborg Halvø with the three new paleo-Eskimo sites, and the raised 33-foot terrace connecting them. The hatched area is supposed to have been under the level of the sea, when the sites were inhabited by the paleo-Eskimos.

Gradually I came to suspect that the broken hills of big stones had been formed at the level of the shore, and that they had not only all of them been formed simultaneously, but were of the same age as the driftwood on the 33 foot terrace between them and on the ancient beach in front of them. But if so, how was their structure to be explained?

As to this, the terrain along the river passing locality C gave a hint. About 30 feet above locality C there was a very similar stone hill, parallel with C and, like this latter, with a broad front projecting right to the river gorge. And down at the present mouth of the river at the shore even a rounded "island" of big and small stones were seen, piled up in heaps and ridges by the ice, and strikingly resembling the two formations at higher levels. Further observations in various parts of Prinsesse Ingeborg Halvø confirmed that the present river deltas exhibit phenomena of entirely the same appearance as localities A, B, and C, at which the flint implements were found. Moreover, it was impossible to find similar occurrences elsewhere on the peninsula.

Thus, there is some reason to regard localities A, B, and C as *fossil river mouths*, which at the paleo-Eskimo time were situated, if not quite close to the shore, at any rate much nearer the shore than at present. This assumption is supported by certain conditions associated with other paleo-Eskimo sites found in the Pearyland area by Dansk Pearyland Ekspedition 1947-50 (Knuth, 1952). Four localities with tent rings and flint implements corresponding to those described in the following pages were highly elevated stony terraces near river mouths but at a level some 40-50 feet above the present deltas.

At localities A, B, and C on Prinsesse Ingeborg Halvø it was the finds of flint implements which led to discovering of the campsites, not the reverse, and it was possible only to identify one tent place in each locality. The presence of a tent ring at locality A is even doubtful, the flint implements lying buried in the gravel at a point about 17 yards from the possible ruin. The boulders on and between the gravel ridges in all the localities formed circles, but one

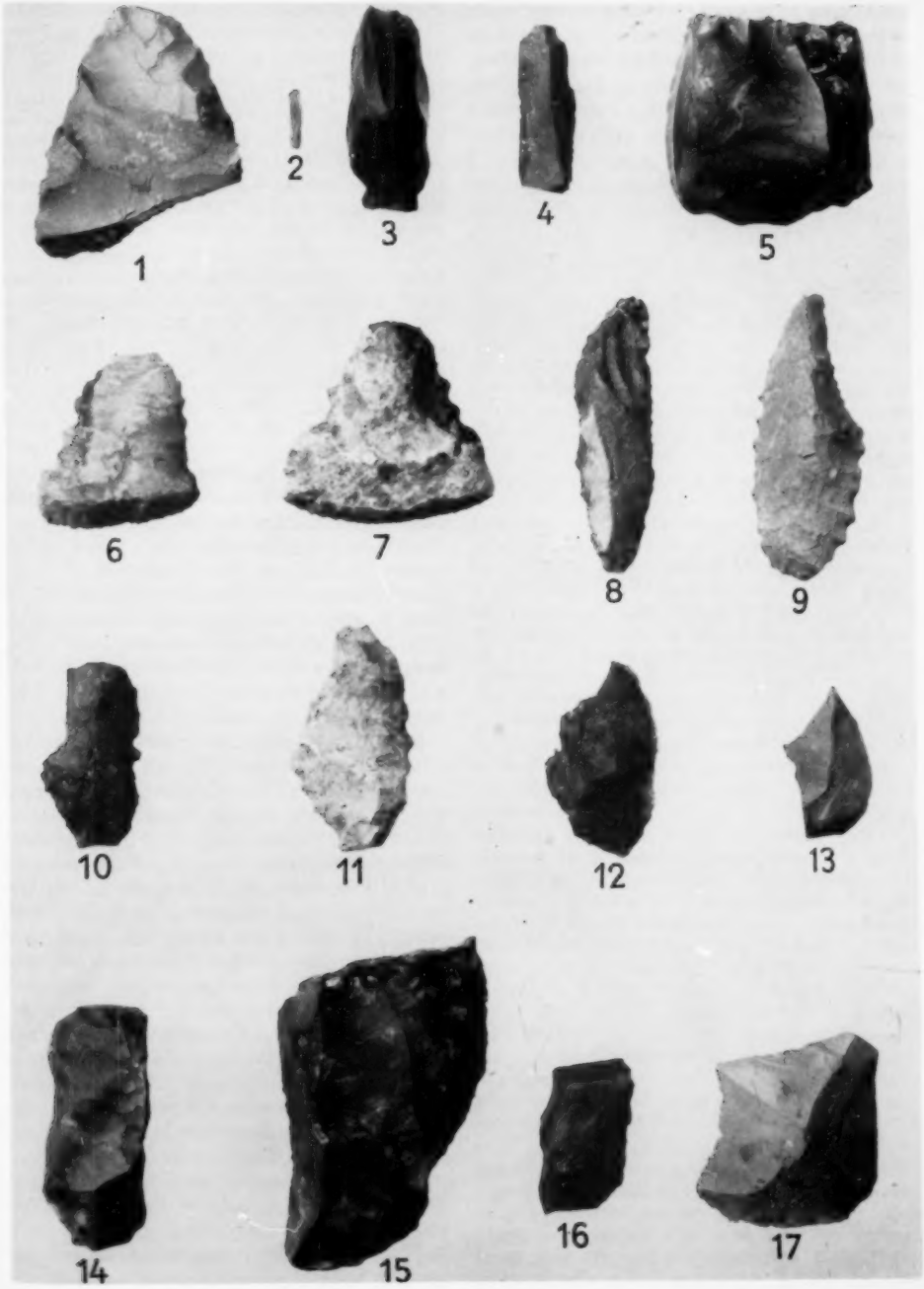

FIG. 103. Tools of flintlike chalcedony from Prinsesse Ingeborg Halvø. From site A: *4, 5, 9, 10, 15.* From site B: *1, 2, 3, 6, 7, 8, 11, 13, 16, 17.* From site C: *12, 14.* *10* is 5.0 cm. in length.

would only have suspected these arrangements to be the work of nature, had not the presence of flint implements claimed for digging. Thus, for instance, in the middle of locality B, an elliptical foundation of stones placed on edge appeared during excavation under the gravel at an elevation of 50 feet above sea level and 370 yards from the present coastline. A similar irregular tent ring with several fireplaces was excavated at locality C, at about 50 feet above sea level and more than 800 yards from the beach.

The finds made at these high-lying stony "islands" were small and confined to lithic material, i.e., implements made of gray, black or reddish-brown flint-chalcedony. Figure 103, *1* shows the point of a broken heavy blade, probably a knife blade. *10-13* are burins of different forms: *10* and *11* are straight trimmed, transverse angle-burins, and both of them have notches at the rear end, showing that they have been hafted. *11* originally had a broad, straight upper edge just like *10* but in the course of use new burin-blows have been struck one after another (Fig. 104, *d*), so that the front edge has been reduced. *12* is likely to be classified as an oblique convex trimmed angle-burin ("parrot-beak"), but a closer study of it shows that the same process has taken place as for the part of *11*, and that the appearance is the result of various repairs (Fig. 104, *g*). Thus, *12* originally seems to have been a straight trimmed transversal angle-burin, too, and had a broad upper edge. Whether *13* is really a burin is a little uncertain. It is quite a thin flake with no trimming at all but it shows two burin facets, one on each side of the working edge, just as an "ordinary" bec-de-flute (Fig. 104, *e*).

Figure 103, *6-9* are scrapers, *6* and *7* convex-edged, both with notches for hafting; *6* with its projecting, curved ("lyre-tailed") corners seems to represent the type prevailing in the Pearyland- and northeast Greenland paleo-Eskimo culture. *7* is a specially beautiful development of the convex-edged scraper implement form, very thin and with a nearly 5 cm. long, carefully retouched curved edge. The back has a concavity parallel to the edge to make this sharper. In shape it is strikingly like an ulo-blade, and one might be inclined to take it as an indication of an otherwise quite natural theory, putting the convex-edged scraper as the ancestor and source of the ulo. *8* is a flake-scraper or flake-knife, retouched the whole way round, and *9* is a concave-edged side scraper. Both have parallels among the Disko Bay finds.

Figure 103, *3*, *5*, *14*, and *15* are cores; *3* a double-core, shown from different sides in the drawing (Fig. 104, *f*). It has parallel flake scars on two surfaces and corresponding two small prepared striking platforms at the ends. *5* is a complete specimen of the form called "handled core" by Mathiassen (1948). Figure 104, *a*, showing facial and edge views, gives clear evidence of the identity of this implement type with forms from the University of Alaska Campus site, pictured by Nelson (1937) and compares to forms from the Gobi desert in Mongolia. Figure 103, *14* is a fragmentary lower keel-shaped part of a similar handled core of which a reconstruction is given (Fig. 104, *b*). The fact is disclosed by the presence on the fragment of five flake-scar ends meeting in a top. As far as the last specimen, *15*, is concerned, no similar remnants of flake beds are visible, but the whole shape and character being so close to the one first described as well as to those of Nelson, must allow us to place it in the handled-core group.

Figure 103, *2*, and *4* show the only lamellar flakes found at the three sites, although the cores tell us that such must have been of great importance in the culture. On the other hand, the finds yielded a comparatively large amount of flake spalls of different sizes, the biggest of them having a length of nearly 4 inches. *17* is a heavy spall, flat at the back and retouched along the lower edge, probably for scraping purpose.

The localities on Prinsesse Ingeborg Halvø yielded but a very small collection of implements. Nevertheless they provide an important contribution to the evidence of a paleo-Eskimo culture in northeast Greenland secured by the Dansk Pearyland Ekspedition 1947-50. However, to understand this it will be necessary to consider the picture as it revealed itself in the main features *after* the Pearyland Expedition and *before* the investigations on Prinsesse Ingeborg Halvø.

For the first time sites and dwelling types of undoubted purely paleo-Eskimo character were observed in Greenland. Most significant was the finding of the site Deltaterrasserne (lat. 82°11′N., long. 31°15′W.) near the head of Jørgen Brønlunds Fjord in the southwestern part of Pearyland. Here 27 stone foundations were situated on terraces at different levels facing the fjord along a stretch of more than half a mile. The level of the lowest-lying ones was only 8 feet, that of the highest-lying ones about 40 feet above the water level of the fjord. The size and fine state of preservation of the site, and the fact that eleven of its eighteen dwelling remains yielded finds, give it a — still undisputed — key position to our knowledge of the fundamental features of the culture.

Of the eleven tent rings, five agreed in appearance, so that we can be sure of the existence of a very characteristic type associated with the paleo-Eskimo culture: The periphery has the form of an ellipse, marked either by an almost invisible gravel wall or a ring of

stones placed close to each other with the ends buried halfway in the gravel. Along the short axis of the ellipse runs, from the front wall to the back wall, a paved passage flanked by flat stones or slender flags on edge, likewise close to each other. In the middle of the passage and at right angles to its sides occur, again, two rows of stones on edge, bordering a square paved room, which is the centrally situated fireplace of the dwelling (Knuth, 1952).

This stone construction seems to represent the foundation of a permanent dwelling form, a mixture between a skin tent and a house, which might be classified as a "tent-house." In the following pages the stone constructions belonging to this type will be referred to as ruins of *"elliptical double-platform dwellings."*

In addition to this, however, another type of dwelling remains occurred, represented by four bigger stone rings, three of which yielded finds: the periphery was circular, marked by scattered stones and a distinct but still low gravel wall. Inside this were a few flags, and in the center an accumulation or circle of stones and flags, underlain by a sometimes thick layer of charcoal. These stone circles resemble, more than those mentioned above, ordinary Eskimo tent rings, apart from the open fireplace in the middle, which gives them their paleo-Eskimo stamp. They may be termed *"circular hearth-tent rings."*

Finally there occurred, on Deltaterrasserne, a couple of elliptical stone constructions, the walls of which consisted of very big stones standing on edge close to each other, surrounding a carefully paved floor without any sign of fireplace, and containing neither bones nor implements. So far an attempt to guess their purpose is useless, and they will be called: "elliptical, paved stone-chambers."

On several other sites in the Pearyland area heavy stone constructions were met with, which undoubtedly derive from the paleo-Eskimos. Many of them showed types different from those described above, but no finds gave evidence of their paleo-Eskimo origin. Here only such sites will be mentioned in which evidence of this kind occurred, either in the form of: 1) implements belonging to the same paleo-Eskimo complex as the finds made in the tent-houses and tent rings at Deltaterrasserne, or in the form of 2) stone arrangements like the remains at Deltaterrasserne of double-platform dwellings or hearth tent rings, in which artifacts of clearly paleo-Eskimo character were found.

At Vandfaldsnæsset in Jørgen Brønlunds Fjord, 10 miles east of Deltaterrasserne, a relatively rich amount of paleo-Eskimo utensils were found in a ruin situated about 40 feet above sea level. The find included lanceolate weapon points, knives, a burin, and — of non-lithic materials — flint flaker points and bone needles. The ruin, lying on a rather steep slope, was so greatly disturbed that none of its many heavy stones had remained *in situ*, and no design could be recognized. The deep debris-layer, however, suggests its connection with a permanent dwelling type.

At Cape Peter Henrik (lat.81°57′N., long. 24°45′W.), on the south coast of Independence Fjord and *ca.* 64 miles east of Deltaterrasserne (Fig. 101), a paleo-Eskimo site was found 50-60 feet above sea level at a riverside. Three

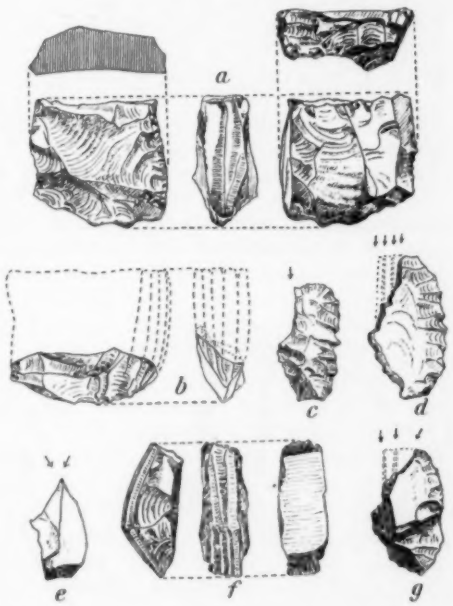

FIG. 104. Cores and burins from Prinsesse Ingeborg Halvø: *a*, handled core from site A (identical with Fig. 103, *5*); *b*, reconstructed fragment of handled core from site C (identical with Fig. 103, *14*); *f*, double-core from site B (identical with Fig. 103, *3*). *c*, *d*, *g*, angle burins from respectively A, B and C (identical with Fig. 103, *10*, *11*, *12*); *e*, doubtful bec-de-flute burin from site B (identical with Fig. 103, *13*).

of the recognizable ruins belonged to the hearth tent ring type. One of them yielded a micro-flake, another a micro-flake and some flint flaker points of bone corresponding to those found at Deltaterrasserne and at Vandfaldsnæsset. Behind the stone rings, at a higher level, six small stone arrangements could be seen, some of them elliptical and divided along the short axis by a row of stones. At a site in Jørgen Brønlunds Fjord two similar stone ovals, above the highest situated camping terrace were found. Investigation of the gravel within them revealed neither implements nor bones. The only reasonable explanation of these much sunken stone ovals is that they mark burials. They are just big enough to encircle a human body, and if this has been laid upon the gravel, covered with skin, it is quite natural that no traces at all remain. A burial custom of this kind is known from the Caribou Eskimos (Birket-Smith, 1929, Fig. 112, p. 301).

At Cape Ludovika, 13 miles east of Cape Peter Henrik, one big ruin was found, about 50 feet above sea level and 220 yards from the beach. It was a very large ellipse (3.5 x 5.5 m.), of a type coming close to the double-platform dwellings, although most of the stones that had flanked the mid-passage were lacking. In the exact intersection between the long axis and the short axis was the fireplace. On the pavement inside the dwelling a broad weapon point of flint and some bone needles were found, and outside the dwelling, in a cache, an ivory harpoon head blank with an oblong gouged hole.

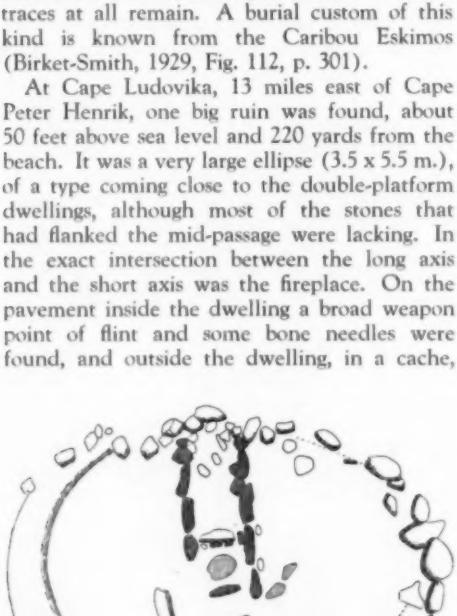

Fig. 105. Elliptical double-platform dwelling No. 11 from the site "Deltaterrasserne," lat. 82°11'N., in Jørgen Brønlunds Fjord, Pearyland.

Proceeding eastwards toward the outer coast we reach the Prinsesse Ingeborg Halvø, with its three lately found paleo-Eskimo sites, on the threshold to the Independence Fjord area. If we continue to the outer coast and follow it southward, we again meet archaeological evidence related to that of the Independence Fjord region on reaching the Dove Bay Area (lat. 76°78'N.), where the Danmark Expedition wintered 1906-08 and discovered an abundance of sites (Thostrup, 1911). Already Thostrup, in this district among other Eskimo remains, gave special attention to high-lying tent rings with "compact stone work," and he describes the double-platform dwelling type as well as the hearth-tent ring type. From his introduction may be quoted:

> In some very old and broken down tentrings it (i.e. the platform edge) consisted of two rows of flat stones standing on end. The place between the rows of stones was filled up with earth and turf, or small rooms in which various things could be kept were formed by means of other stones placed at right angles to the platform edge.
>
> In some tentrings a collection of stones, mostly flat, was found almost in the centre of the floorplace. It is probable that the lamp stood here.

As will be seen, Thostrup did not observe that the "small rooms" in the double-platform dwellings and the "stone collections" in the center of the hearth rings were open fireplaces. But again and again, when describing one of these ruin types, he underlines its very old-looking appearance. He believes that the heavy stone ovals at Sælsøen "show the outlines of tents for winter use" (Thostrup, 1911, p. 295), and he suggests their connection with a remote first invasion to east Greenland from the north by Eskimos carrying on musk ox hunting on a large scale (Thostrup, 1911, p. 336-7).

Thostrup did not examine the old tent-house remains closely enough to make finds within them, and besides he did not know that what he had to search for was very tiny micro-flakes and scrapers of flint, hardly distinguishable among the pebbles. The present author, during a stay in Dove Bay 1938-39, came across the remains of a double-platform dwelling on Røde Ø, and found in it an adze blade of hard silicious slate. The ruin in question was on a low point close to the beach, and the adze blade showed signs of grinding. When visiting the

area again in 1950 after the Pearyland Expedition, I traced some of the double-platform ruins mentioned by Thostrup and could verify their identity with the type from Deltaterrasserne. Because of the rich lichen growth on the pebbles no flint implements could be seen. In a very heavy built stone ring belonging to the hearth ring type, however, I found a micro-flake.

Leaving the Dove Bay area, the next evidence of paleo-Eskimo culture is met with at Zackenberg (lat.74°31'N.) at the head of Young Sound. On a barren gravel terrace about 30 feet above sea level a camping site was discovered by the Pearyland Expedition in 1949 but the stone settings were confined to highly obliterated, ancient-looking pavements and fireplaces. Just as at Prinsesse Ingeborg Halvø, the finds revealed the paleo-Eskimo character. Scattered around on the terrace surface and on the slope in front of it lay hundreds of flint spalls and among them chipped implements, such as: flake-scrapers, burins, a weapon side blade, and some micro-flakes (Knuth, 1952, Fig. 14, p. 30-31).

Finally, at Revet, not far from Zackenberg, and in Moskusokse Fjord, 70 miles further south, traces of former paleo-Eskimo settling were found in 1932 by John Gjæver (Solberg, 1932). At the first place only flint debris occurred, at the second place, in a sandy slope, chipped implements: weapon points, scrapers notched for hafting (convex- and concave-edged), and micro-flakes. Solberg compares these finds to those from his "stone age" in Disko Bay in west Greenland. The culture unity concerning the implement-locality in Moskusoksefjord, however, is not quite clear, as ground slate artifacts belonging to the northeast Greenland culture are mixed up with the flint.

THE INDEPENDENCE CULTURE

The above survey comprises an area of northeast Greenland between lat.74°N. and lat.82°N. with a coast-stretch of about 800 miles. Within this area a number of settlements and finds were pointed out which must, for several reasons, be taken to represent one and the same culture. The reasons are already given in part by the fact that the selection required no theoretical considerations, the settlements as well as the finds marking themselves distinctly out from the archaeological continuity.

Only by breaking the practice usually followed by archaeologists, did we succeed in tracing these settlements in the field. Thus we left the ordinary hunting grounds for Eskimo archaeology on capes along the shore, climbing to stony gravelly patches, in many cases situated at such great heights above sea level and at such great distances from the shore that beforehand you would not expect to find Eskimo sites there. And although they were only tenting grounds, often almost obliterated, we were not content to assume a cultural connection and a simultaneity between the tent rings and nearby house ruins at the shore. We concentrated on a careful sifting of the sterile gravel in the rings and dug them out to the bottom, a practice never before considered worth while in dealing with such temporary dwellings as tent rings.

In this way it was firstly recognized that many of the tent rings, owing to their solid construction, deviated so essentially from the type of ordinary Eskimo summer dwellings that they must be regarded as more permanent housings. As another result, a collection of stone and bone implements gradually heaped up, sharply distinguishable from all other finds from excavations of Greenland Eskimo ruins because, without exception they showed a purely paleo-Eskimo character.

The type list which can be drawn up on the basis of the finds, derives its material from eight sites located around the Independence Fjord, and from the terrace at Zackenberg, and in these nine localities the implements were found both within the tent rings and among the stones of the terrace just outside the rings. All the bone artifacts come from the Independence Fjord region, and to the list of stone implements from the northern localities the Zackenberg terrace adds only two types, viz., side blades and flake end scrapers. The tent ring types of the Dove Bay area have supplied no contribution to the list. Nothing has been found within them, and so far we must be content with the fact that accordingly they have revealed no nonpaleo-Eskimo artifacts either, which might disprove their belonging to the culture under discussion, or render this a less homogeneous aspect. The culture will,

for the sake of convenience, be referred to as the Independence culture, and its trait type list runs as follows:

NON-LITHIC MATERIAL:

1. *Harpoon head*; open socket; sunken belt for lashing; groove for side blade; gouged line hole through the rear end; no spurs.
2. *Harpoon head*; small; open socket; sunken belt for lashing; no groove or split for blade; round line hole from upper to lower side.
3. *Flint flaker point*; small.
4. *Bone needle*; round or oblong eye.

LITHIC MATERIAL (flint; flint-like chalcedony; silicious slate):

5. *Side blade*.
6. *Triangular point*; wide concave notch on each side near the base.
7. *Arrowpoint*; lanceolate; semistemmed.
8. *Knife blade*; straight or curved back; one convex edge.
9. *Side scraper*; concave edged.
10. *Flake side scraper*; double straight ("flake knife").
11. *End scraper*; convex edged.
12. *Flake end scraper*; long; straight.
13. *Graver*; thick, straight-sided piece of stone with one prepared corner.
14. *Burin*.
15. *Burin spall*.
16. *Adze blade*; rough-hewed; triangular in cross section.
17. *Core* (double-core; handled core).
18. *Micro-flake*.

Owing to the apparently characteristic scarcity of implements left, the list is brief and doubtless incomplete. The interest associated with it is all the greater because here — apart from Lauge Koch's small Dorset find on Hall Land (Mathiassen, 1928) — for the first time within the archaeology of Greenland, we are dealing with a culture from paleo-Eskimo sites. Material for comparison must be obtained from the paleo-Eskimo localities of Alaska and Canada, as well as from the now fairly numerous collection of paleo-Eskimo implements from Greenland soil. According to the conditions under which they were found, these other paleo-Eskimo finds from Greenland can be divided into two groups:

1) Paleo-Eskimo implements in apparently unmixed occurrence, collected by nonarchaeologists, without possibility to point out neither sites nor dwelling-types from which the implements originate. To this group belong the many early finds from Umanak district and Disko Bay in west Greenland, which already 46 years ago induced Solberg to put forward the theory of a "West Greenland Stone Age" (Solberg, 1907). Furthermore the group includes a local find of recent date, also from Disko Bay, made in 1948 by Hans Mosegaard Vat Sarqaq and treated by Meldgaard, who considers its elements representing an earlier phase of "The West Greenland Paleo-Eskimo Culture" (Meldgaard, 1952).

2) Paleo-Eskimo artifacts as components of a mixed culture, indigenous to the house ruins of this mixed culture, such as were found at Inugsuk (Mathiassen, 1930), on Inglefield Land north of Thule (Holtved, 1944), on Sophus Müllers Næs south of Pearyland (Knuth, 1940), in Dødemandsbugten in northeast Greenland (Larsen, 1934; Bandi and Meldgaard, 1952), at Scoresbysund (Jens Kai Rasmussen, 1925), and at Angmagssalik (Mathiassen, 1933).

The points of similarity between the Indedependence culture and group 2) above are sporadic. Thus concave side scrapers, convex end scrapers, and triangular points with side notches are found both at Dødemandsbugten, Scoresbysund, and Angmagssalik, while from the two last-mentioned localities burins are also available. An interesting phenomenon within the archaeology of Greenland is formed by house ruin No. 1 at Utorqormiut near Angmagssalik, which at the excavation carried out by Therkel Mathiassen proved to contain merely stone objects (Mathiassen, 1933, p. 44). Among these occurred, in addition to convex end scrapers and burins, the upper end of a broad knife blade and a double-core of red chalcedony, shaped precisely like the piece from Prinsesse Ingeborg Halvø (Fig. 103, 3 and Fig. 104, *f*). The convex end scrapers and the burins were all very small and most of them showed traces of grinding — features pointing to Disko Bay rather than to northeast Greenland.

A far more comprehensive similarity exists between the Independence culture and the Greenland finds of group 1) above, that is to say, the elements of the west Greenland stone age alias Meldgaard's west Greenland paleo-Eskimo culture. Almost all the types of stone implements in the list for the Independence culture are represented in the west Greenland

finds, and several of them in the same form, i.e., triangular blades with side notches, oblong oval concave side scrapers (like Fig. 103, 9), convex end scrapers with "flaring" front corners, and handled cores. A total of seven cores, or fragments of cores, are at hand from Disko Bay, one of which is a very broad and flat handled core from Sermermiut in the National Museum of Copenhagen with even longer and narrower flake scars than the specimen (Fig. 104, *a*) from Prinsesse Ingeborg Halvø.

From the similarity between the west Greenland and the northeast Greenland paleo-Eskimo culture it follows that the placing of the former in relation to the Dorset culture and paleo-Eskimo cultures from Alaska, demonstrated by Meldgaard, may also in the main features be transferred to the latter. However, the Independence culture elucidates the problem more sharply, also as regards the west Greenland culture. To the lacking typical Dorset culture elements mentioned by Meldgaard, of which the wide triangular blade with a concave base was the most important (Meldgaard, 1952, p. 229), should for the Independence culture be added: oval soapstone lamp, and Dorset harpoon head. It does seem more than a mere accident that careful digging in and around the many paleo-Eskimo tent rings within the Independence Fjord region did not bring to light the slightest fragment of soapstone. If we combine this fact with the evident similarity existing between the double-platform dwelling and the Ipiutak house, it seems natural to assume the absence of lamps to be an ancient paleo-Eskimo feature. And we do this with an even easier conscience, all the more so since the Independence culture exhibits other points of similarity to the Ipiutak culture — more than the west Greenland stone age and the Sarqaq find.

It may, of course, be due to a mere chance that Dorset harpoon heads are lacking in the northeast Greenland paleo-Eskimo culture; but, on the other hand, it is noteworthy that the only two harpoon heads from this culture represent types which are more closely related to the traditions of the Ipiutak culture than to those of the Dorset culture. From Greenland there is none, and from the Canadian Dorset region there is only one single harpoon head at hand, corresponding to type 1 of the Independence culture list, that is to say, with the following features: groove for side blade; open shaft socket; sunken belt for lashing; flat, outward bent rear end with narrow, gouged line hole. The specimen in question (National Museum of Copenhagen number P. 7. 208), to which attention was already called by Collins (1943, p. 224), is included in Mathiassen's collections from Button Point at Pond Inlet, but it is not derived from the actual Button Point, which yielded the characteristic Dorset culture artifacts, but from a nearby locality, Igagdjuaq (Mathiassen, 1927, I, P. 209), where no archaeological investigations were made. The Igagdjuaq specimen, moreover, has the groove for the side blade in the left side, like the Pearyland specimen.

The small, much weathered harpoon head without a side or end blade, but with an open socket and a single spur, representing the Independence culture type 2, points both to the Dorset culture types from Button Point and to various types from Ipiutak (Larsen and Rainey, 1948, Pl. 5, 14). The majority of the Ipiutak specimens, however, have inserted end blades. It should be pointed out that both harpoon heads were found on the lowest bench at Deltaterrasserne, only about 8-10 feet above sea level.

A very striking Ipiutak feature in the Independence culture is the small flint flaker points which occur in an entirely identical shape in Ipiutak and Near Ipiutak (Larsen and Rainey, 1948, Pl. 43, 9 and Pl. 86, 2). In this connection it is of importance for the placing of the Independence culture, that this cultural element seems to be represented also in the Sarqaq find, which is otherwise handicapped by the lack of nonlithic material. The Sarqaq piece, which escaped Meldgaard's attention (National Museum of Copenhagen number L. 6. 3915), corresponds in length and shape to those from the Independence culture.

Other Ipiutak features in the Independence culture are: bone needle, side blade, semi-stemmed arrowhead, and flake side scraper, double straight. The last mentioned (Fig. 103, 8) was represented in twenty-one Ipiutak houses as a "rather uniform type" (Larsen and Rainey, 1948, Pl. 17, *17-19*), but it also occurs in the Denbigh Flint complex (Giddings, 1951, Fig. 59, *b*, 8), and in Siberia (Field and Prostov, 1937, Fig. 1, *17*).

The triangular blade with wide notches at the sides (type 6) seems to occur both in the Dorset culture (Leechman, 1943, Pl. A, 9) and

in Ipiutak (Larsen and Rainey, 1948, Pl. 46, *17*), but is especially frequent in Greenland. Thus it has been secured from house ruins on the east coast, in Dødemandsbugten (Larsen, 1934, Pl. 3, *31*), and from house No. 1 at Utorqormiut (Angmagssalik). It is a very predominant feature in the west Greenland stone age. A specimen was found at Igagdjuaq near Button Point.

The knife blades (type 8) of the Independence culture are present in various forms. The smaller form with an almost straight back seems to have parellels among the Dorset implements from the Hudson Strait (Leechman, 1943, Pl. A, *14*). To the large, much curved form I have failed to find parallels either from Greenland or from arctic America. Both forms were represented on the lowermost ledge at Deltaterrasserne, where also the harpoon heads were found, and the one knife blade found here was distinguished from all the other stone implements belonging to the Independence culture by showing traces of grinding on the back.

The convex-edged end scraper (type-11), like the knives, had various forms. It is a question whether the form with "flaring" front corners, mentioned by Meldgaard as a proof of the Dorset elements in the west Greenland paleo-Eskimo culture, can actually be regarded as a Dorset characteristic. Apart from two specimens from Nuvuk and McLelan Strait (Leechman, 1943, Pl. A, 8 and B, 2), it does not occur, as far as I know, in the Dorset finds, where, on the other hand, the smaller straight sided, trapezoid form is predominant. Wintemberg's one or two specimens from Newfoundland (Wintemberg, 1939, Pl. VI, Fig. 2, No. 31), correspond in no way to the type. However, it is known from the Tigara phase at Point Hope, and in Greenland it occurs more frequently on the northeast coast than in other places.

As regards the last elements mentioned in the type list — the burin, the core, and the micro-flake — the Independence culture diverges from the Ipiutak culture and approaches, like the west Greenland paleo-Eskimo culture, to the Dorset finds from Newfoundland, the finds from Alaska (Denbigh Flint complex, University of Alaska Campus site, Brooks Range), and the finds from the Aleutian Islands. However, these perspectives of relationship also seem to be more distinct and more comprehensive than is the case of the west Greenland paleo-Eskimo culture.

In proportion to the quantity of the material, the prepared cores, and especially their mesolithic form as "handled cores," constitute a much greater percentage in the Independence culture than in the west Greenland complex of finds. We observe, as is the case with the Denbigh complex, a marked predilection for the use of flint or chalcedony at the expense of silicious slate, which dominates in Disko Bay, in spite of the fact that the former rocks are of rare occurrence in northeast Greenland. Associated with the nature of the material are a few very characteristic features in the treatment of it by the Independence culture people, which features are also found in the Denbigh complex: The lack of grinding, and the careful modeling by means of fine chipping of rhythmically arranged notches for hafting. As mentioned above only one of the knife blades from Deltaterrasserne showed signs of grinding, while this technique is a common feature of the west Greenland stone implements, no matter whether the material is chalcedony, quartz or silicious slate. Rows of notches are seen on a few points in the Dorset collections from Newfoundland (Wintemberg, 1939, Pl. VI, Fig. 2, *14* and *15*. Harp, 1951, Fig. 67, *a*, *11-12*). No lamellar flakes from northeast Greenland had retouching along the edges like those coming from Cape Denbigh and Newfoundland.

The most conspicuous difference between the artifacts of the Independence culture and those of the west Greenland finds, including Sarqaq, has relation to size and shape. Even if we are concerned with uniform types, the northeast Greenland tool or weapon point exhibits an enlarged scale and a rougher, more primitive execution. The similarity between the west Greenland burins and the specimens from the ancient cultures of Alaska has previously been pointed out (Meldgaard, 1952, p. 228; Collins, 1953b, p. 36). This similarity is less striking today, after the sites on Prinsesse Ingeborg Halvø have increased the inventory of the Independence culture by a few new specimens, which are even more closely related to the Alaska types (Fig. 103, *10-12*). Such broad and thick burins, of a length of 4-5 cm. and without grinding, do not occur either in the west Greenland stone age area or in other parts of Greenland, but are present in the Denbigh complex (Giddings, 1951, Fig. 60, *a*), and finds

from Brooks Range (Collins, 1953 b, Fig. 3, *e*). But the Independence culture has set its mark on them, also, by providing them with rows of notches for hafting, thereby emphasizing their character of a solid instrument. This burin variation seems so far to be without parallels in the Eskimo world.

Not only that certain tools of the Independence culture are of a more solid character than the corresponding ones from west Greenland, but the many small, narrow, flat, and ground burins from the west Greenland stone age are entirely lacking in the Independence culture. The same applies to the small forms of straight sided convex end scrapers and the finely chipped thin weapon points. The west Greenland paleo-Eskimo culture, as well as Dorset, Denbigh and Ipiutak, show to a varying extent a greater specialization and a more highly developed technique than revealed by the finds so far made in northeast Greenland. Owing to this circumstance alone it is difficult to characterize the Independence culture as Dorset culture. Compared one with another, the Dorset culture very distinctly holds its own as a refined miniature culture, with a severe and peculiar style, while the Independence culture shows more general, and possibly also more original, features.

The dwelling structure type gives the Independence culture a unique position at the moment. From none of the paleo-Eskimo sites with core- and lamellar-flaking industry — the Aleutian Islands, Cape Denbigh, Fairbanks, Brooks Range, and the Dorset sites in eastern Canada—is there evidence of elliptical double-platform tent-houses. After the experiences gained in northeast Greenland in 1952, this does not exclude the possibility of their existence at some of these sites, which with respect to topography and geomorphology seem to be very much like the places on Prinsesse Ingeborg Halvø. Nobody would have suspected the stone arrangements here of being human work. And on Deltaterrasserne a double-platform construction, even more concealed, was found in 1950. In fact nothing else could be noticed in this case than an untouched, quite level terrace-surface. First by digging on a spot, where flint tools occurred, the upper edges of vertically standing slender flags appeared under the cover of windworn pebbles.

After my description in the Arctic of the paleo-Eskimo dwelling remains in northeast Greenland (Knuth, 1952, p. 29-32), Collins has called attention to his observations in a Dorset-Thule site at Frobisher Bay, Baffin Island, where in 1948 he found "a number of oval and rectangular stone enclosures, formed of massive blocks of granite, closely spaced and some set deeply in the ground" (Collins, 1950). He comments further on these stone structures, saying that "they differ from the usual Thule tent rings, and they may have been foundations of old Dorset houses, the roofs of which were of skins" (Collins, 1953b, p. 32). This agrees well with my earlier suppositions regarding the ruins of "tent-houses" in Pearyland (Knuth, 1952, p. 30), as well as with Harp's statements about his investigations at Port au Choix - 2, Newfoundland. Harp's Dorset "houses" were "shallow round pits" with a hearth in the entrance gap and surrounded by a ridge under which digging revealed a ring of stones "piled around the exterior edges of a dwelling, possibly to anchor it to the ground." He realizes "that the aborigines who once dwelt here probably lived in skin tents, all traces of which had long since disappeared" (Harp, 1950).

Summary and Speculations

The Independence culture is a paleo-Eskimo culture, associated with sites on barren gravel-terraces often high above sea level in northeast Greenland, including Pearyland. The bearers of this culture lived in tents with heavy foundations of stones set close together on edge, and they probably used these dwellings all year round. The "tent-houses" had centrally situated fireplaces, and some dwellings were elliptical, having a platform on each side of a paved fireplace "passage," the sides of which were marked out by rows of flags on edge. Lamps seem to have been unknown; the same applies to drill technique, stone-built fox traps, and stone-built graves. The dead bodies were possibly laid on the gravel within an oval of smaller stones, and covered with hide. The Independence culture people were primarily musk ox hunters, but also hunted seal (*phoca hispida*), hare (*lepus arcticus groenlandicus*), brent geese (*branta bernicla*), ptarmigan (*lagopus mutus*), and fished trout (*salvelinus alpinus*) at the river mouths and at the lakes.* Only a single piece of antler is found among the bone material from the sites, so there can

* The animal bones have been identified by Ulrik Møhl-Hansen.

have been but few reindeer — if any at all — in the Pearyland area at the time of the paleo-Eskimos.

The Independence culture people made weapons and tools of bone and hard stones, such as flint, chalcedony, and silicious slate. Only two tools show signs of grinding, and these came from very low-lying double-platform dwellings. If the level of the sites reflects a chronology of the invasion of the paleo-Eskimos, we must conclude that the grinding technique marks a late stage of development of the Independence culture.

The Independence culture has features in common with paleo-Eskimo finds from Greenland, the Canadian Dorset area, and Alaska. It is closely related to the west Greenland stone age now termed the west Greenland paleo-Eskimo culture. There are many points of similarity to the Canadian Dorset culture, but at the same time differences are so essential that the Independence culture cannot be characterized as Dorset culture. The core and lamellar flaking industry of the Independence culture as well as its forms of burins and its treatment of the material are mesolithic and upper paleolithic traits, which assert themselves also at the Denbigh Flint complex and many Alaskan inland sites. They tempt one to agree with Harp (1951, p. 220), when he thinks it is "wise to keep alive the question of the circumpolar complex," and it must at any rate be justifiable to regard the above mentioned evidence as relics from the proto-Eskimo culture stage. The apparent lack of graves and absence of permanent winter dwellings of the Independence culture are likewise, according to Birket-Smith (1951, p. 151), proto-Eskimo traits.

However close the relationship between the Independence culture and the paleo-Eskimo complexes in west Greenland, they are not identical. The examination of the material from northeast Greenland established the particular stamp of the Independence culture: a purer paleo-Eskimo character, and more distinct perspectives to the core- and lamellar flake cultures of Alaska than is the case for the west Greenland finds. It would seem that with the few elements of the Independence culture and with the simple shapes of the bone and stone implements we come nearer to a common, more original, cultural stage — a stage in relation to which not only the Dorset, Denbigh, and Ipiutak, but also the west Greenland paleo-Eskimo culture are specifically developed phenomena.

We may imagine that a culture on a similar stage as the Independence culture was the *primus motor* for the development in the Umanak area and in Disko Bay in west Greenland. However, the stretch from the Thule district southward along the west Greenland coast was a high road for cultural currents, and it is doubtful, therefore, whether archaeological traces of the first immigration stage can be found. Possibly the developments away from the more primitive form, represented by the Independence culture, were already initiated in the Thule district.

The fact that fairly undisturbed traces of an original culture wave are found in the remote area of Pearyland, has several and just as reasonable explanations. In the first place it is quite possible that the migration followed the route from Lake Hazen in Ellesmere Island across the narrow Robeson Channel far north of the Thule district and Inglefield Land, thus keeping free of possible special local developments in these areas. Moreover, there is every probability that climatic fluctuations exerted a regulating influence on the few and small waves of invasion proceeding around the north of Greenland.

It is hard to believe that a people, living in hide-covered tent-houses and using open fire the whole year round, would have set out for such northerly areas, had not the climate and the resources been better than they are now. Several facts suggest that a warmer climate prevailed at the time of the Independence people. Bones and bone artifacts were nowhere found lying loose on the gravel, and at Prinsesse Ingeborg Halvø they did not even occur below the surface, though the localities there are only free of snow during some few months of the year. This fact may, as Collins says in his mention of the finds from Disko Bay, be explained by assuming that the bone material "accumulated during a warm period, when the gravel thawed in summer, so that everything but stone disintegrated" (Collins, 1953b, p. 36).

The paleo-Eskimo migration along the north coast of Greenland to Pearyland must have taken place in a warm period, when the musk ox, also, found it natural to go northward. And when the climate became more severe, the northeastward route was again barred, so there was all the more reason to push south-

ward to the richer hunting fields of west Greenland. The paleo-Eskimos who had managed to get through to the northeast, became isolated with their original culture in the Independence Fjord area, and during the continued deterioration of the climate moved southward along the east coast in the track of the musk ox, as already assumed by Thostrup.

But are all these assumptions supported by observations made within the area of the Independence culture, and is there any possibility of judging its age?

As stated in the introduction of the present article, on Prinsesse Ingeborg Halvø driftwood was particularly abundant on the 33-foot terrace connecting the high-lying "fossil" river mouths, where flint implements occurred. This horizon must be associated with a warm period, when there was less ice in the Polar Sea and when consequently, conditions were especially favorable for carrying logs from Siberian river mouths and stranding them in northeast Greenland.

The presence of sites on the same horizon as the driftwood of course needs no other explanation than that offered by the fact that Eskimos settle as near a supply of timber as possible, even if it occurs well above the shoreline. The driftwood horizon may quite possibly already have been subfossil at the time of the arrival of the paleo-Eskimos, but lying at a much lower level than today. Since, however, the invasion of the paleo-Eskimos, as stated above, probably took place during a warm period, and since conditions in other localities along the south side of Independence Fjord correspond to those on Prinsesse Ingeborg Halvø, the whole question would become needlessly complicated, if we did not assume the warm period of the driftwood invasion and that of the Eskimo invasion to be one and the same. If the driftwood horizon formed the shoreline at the time of the Eskimos, and we estimate the rise since then to have averaged 1 cm. annually, corresponding with measurements carried out in recent time in the Baltic (Witting, 1943), it will have taken 1,000 years for the driftwood horizon to reach a level of 33 feet or 10 metres. This takes us back to the time before the arrival of the Norsemen in Greenland, when, according to the supposition of Holtved, the Dorset culture made its entry into Inglefield Land (Holtved, 1944, p. 177).

However, the average annual rise in Greenland as well as the continuity of the process are not known, and there is reason to assume that the arrival of the Independence culture people dates further back than to around the year A.D. 1000. Eskimos with a developed Dorset culture at the Marshall Bay stage must have reached Ellesmere Island in the centuries immediately before the year A.D. 1000, and the Independence culture people would have met them either here or earlier on their migration in the Canadian Arctic. Considering that the Independence culture is, relatively, as slightly influenced by the Dorset culture as is the case, such encounters with Dorset vanguards can hardly have taken place so we must assume that the Independence culture crossed Lancaster Sound and Jones Sound several centuries prior to the year 1000.

Pollen analysis of peat samples from the Godthaab district have demonstrated that a rather marked warm period existed in Greenland before the time of the Norsemen (Iversen, 1934, p. 350). The dating and the duration of this period are still uncertain. There is a possibility that it coincided with one of the warm periods known to have occurred in Europe, either that at the transition from the Bronze age to the Iron age about 600 years before Christ or the warm period of the Roman Iron age, 400-500 years after Christ. The latter would seem the more probable, and it would be in good agreement with our reasoning concerning the Independence culture to suggest its arrival in Greenland as early as about the year A.D. 500.

Thus the conditions on Prinsesse Ingeborg Halvø seem to provide clues to an estimation of the time of paleo-Eskimo immigration. There remains, unfortunately, the disturbing fact, already mentioned above, that not all the Independence culture tent rings are found at the same level. On Deltaterrasserne at the head of Jørgen Brønlunds Fjord, and on Røde Ø in Dove Bay, double-platform dwellings were met with as little as 8 feet above the sea. Unless there have been great local differences in the degree of elevation, we must take the sites on Prinsesse Ingeborg Halvø to be considerably older than the lowest-lying site on Deltaterrasserne, where the ground knife blade was found.

A satisfactory explanation of the phenomenon cannot be given at present, so we must postpone the question of dating the Independence culture, hoping that radiocarbon analysis will in the near future bring new elements into the discussion.

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Nationalmuseet
Copenhagen, Denmark
July, 1953

RALPH LINTON

On December 24, 1953, Ralph Linton completed a very active and productive life span. He would have been 61 years old on February 27, 1954. Born in Philadelphia, in 1893, he received the B.A. degree at Swarthmore College in 1915, the M.A. degree at the University of Pennsylvania in 1916, and the Ph.D. degree at Harvard University in 1925. He was Research Associate in Ethnology at the B. P. Bishop Museum, Honolulu, 1919-20; Assistant Curator of Ethnology at the Field Museum of Natural History (now the Chicago Natural History Museum), 1922-28; Professor of Anthropology, University of Wisconsin, 1928-37; Professor of Anthropology, Columbia University, 1937-46 (Chairman 1939-43); and Sterling Professor of Anthropology at Yale University from 1946 to the time of his death.

It should be emphasized that Linton was an anthropologist in the broadest sense of the term, his active interests covering every somewhat controversial subdivision of that somewhat controversial term. It was during a discussion with the writer that Linton, during the last year of his life, speaking of the interdependence of all social studies, expressed the opinion that any definition for one of the various subject aspects of anthropology was arbitrarily loose, since, no matter what the restrictions set forth in the definition might be, the student in the subject field so defined would have to transgress the boundaries so prescribed in order to be equipped with adequate background to do his work.

The specific purpose of these obituary comments is to review Linton's work in, and conceptual attitude toward that loosely defined approach to the study of human society which we call archaeology.

Linton's early field experience was almost exclusively in archaeology. In 1912 he had his first taste of field work in New Mexico. In the following year he spent one season in Guatemala, while a student at Swarthmore. After graduating from college, and entering the graduate school at Pennsylvania, his continued interest induced him to participate in archaeological projects in New Jersey and Illinois.

World War I interrupted Linton's graduate work at Harvard, and shortly after his discharge from the U.S. Army, he joined the crew working under J. Walter Fewkes at Mesa Verde National Park, Colorado. Immediately following, he participated in the Bayard Dominick Expedition, directed by the B. P. Bishop Museum of Honolulu, assigned to the Marquesas Islands with instructions to cover archaeology and material culture. However, his growing interest in the total human picture, and his natural tendency to avoid specialization led him to begin a study which ultimately included all of Polynesia: its peoples, their cultures, their histories, and their status within the frame of human society. He felt it to be quite impossible to report on the material culture of the Marquesas without at least an introductory review of Marquesan social organization and religion.

In 1924, while employed as Assistant Curator of Ethnology at the Field Museum of Natural History, Linton collaborated in archaeological investigations in Ohio, which served to focus his interest in middlewestern archaeology, an interest which, rather than being submerged by his teaching and writing activities in a more general field, were incorporated into a comprehensive approach to American-wide and world-wide archaeology, and integrated with his expanding social concepts.

Upon Linton's return from his ethnological studies in Madagascar, he was appointed Professor of Anthropology at the University of Wisconsin; and, in 1935, he completed arrangements for an archaeological project in Wisconsin financed by the University, and conducted by the Division of Anthropology, Milwaukee Public Museum. This agreement between the two institutions resulted in two summer-long field projects which brought to the attention of local archaeologists a new cultural manifestation: The Clam River focus, a protohistorical culture featured by compound burials in large mounds, and tentatively identified with the Sisseton Sioux. Unfortunately for this project, previous to the publication of any results, Linton left Wisconsin. With his departure there ensued a lapse in organized archaeological research in that state enduring for more than a decade.

Linton was always alert to the possible significance of factual data supplied through archaeological efforts. He was the first to postulate the probable Siouxan origin for the Clam River mounds. He became an enthusiastic supporter of the hypothesis for the Asiatic origin of the Woodland type of pottery, and of an Archaic affinity for the heavily corroded, utilitarian copper implements of the Wisconsin area. He encouraged investigation into the problem of sub-Arctic, even circum-polar prototypes for these artifacts. Although his primary interest was in people and social phenomena rather than in research methods, he manifested a keen interest in efforts to apply taxonomy to archaeological procedure.

Realizing the essential importance of time to any comprehensive study and understanding of the functioning of culture, and conscious of no separation between cultural activities and material equipment — knowing from personal observation that a drum, a ceremony employing that drum, and a concept motivating that ceremony, are inseparably linked parts of cultural activity, Linton was as interested in material products, whether of ancient or recent origin, as he was in the activity and concept which they represent. He delighted in exhibiting his extraordinary memory for details by identifying the place and character of some obscure museum specimen, or correcting the false identification appearing on a label. This was a part of his equipment toward attempting to visualize as a whole the complex pattern of human society: the adjustments of the individual to cultural tradition, as modified by natural and social environment, manifested in practices which require the use of environmental materials, subject to change through growth in time.

Linton is best known for the ideas expressed in such books as *The Study of Man*, not for his relatively minor publications on archaeological subjects as such; but the archaeologist can find in practically any one of Linton's more important contributions matter of interest to archaeologists, derived from a wide knowledge of archaeologically produced data. His loss to archaeology is that of one who, more indirectly than directly a contributor to the subject, nevertheless knew and acknowledged the place of archaeology in the discipline of anthropological study, and applied that knowledge throughout his work as a teacher and writer.

In spite of accusations that he was opinionated, intellectually competitive, and professionally suspicious, even though these judgments may be not wholly unjustifiable, his very critics must admit that Ralph Linton possessed one of the most intelligently alert, brilliantly productive minds in the field of anthropology for his generation.

WILLIAM C. MCKERN.

(*Continued on page 410*)

FACTS AND COMMENTS

REPORT ON THE SOUTH PERUVIAN COAST: CHALA TO ARICA

Early in 1953, the author and Richard Schaedel, while traveling the Carretera Panamericana, undertook an archaeological examination of the coastal regions of Peru from Chala to the Arica area of Chile. The survey was remarkably unproductive. Publications concerning this region are also remarkably scarce. Uhle (1919) published a monograph on the archaeology of the Tacna-Arica area; and Kroeber (1944) discussed briefly the northern part of the region. Other than this, the scientific literature seems to be a blank, although the chronicles state that Inca domination, at least, was an accomplished fact.

The reason for the paucity of sites is seen, in part, in the nature of the country, a description of which may be in order at this point. From Chala south to Atico, a distance of 89 kilometers, the road passes for the most part along a narrow coastal plain which in this area is merely a rocky beach, never more than 3 kilometers wide. Back of this beach the coastal range of the Andes rises very abruptly. Leaving Atico, the beach disappears and from here to the Chilean border the coast is characterized by a plateau, ranging in altitude from 1,000 to 2,500 meters, which begins at the western edge of the main range of the Andean cordillera on the east and on the west drops abruptly into the sea. This plateau is, for the most part, devoid of water and vegetation and must have been as unsuitable for prehistoric occupation as it is for settlement today.

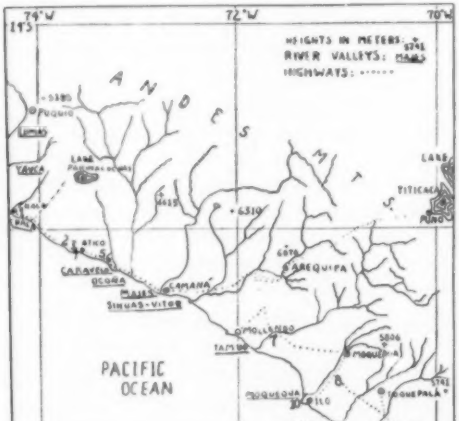

Fig. 106.

Over the distance of approximately 650 kilometers from Atico to a point roughly speaking 50 kilometers north of Tacna, these conditions prevail; the plateau is broken only by eight river valleys. These valleys, unlike those of the central and north coasts, are merely deep canyons cut through the plateau in forms resembling those of the Grand Canyon of the Colorado and similar canyons of southwestern North America. The rivers have cut deep channels, leaving sharply eroded buttes and cliffs. These channels are now dry; the country is completely inhospitable, and the canyons always must have presented, as they still do, great obstacles to north-south movement. The present channels of the various rivers at the bottom of the canyons run in flat land ranging from 1-3 kilometers in width. The edges of this flat land are invariably characterized by steep banks of over 100 meters in height. Modern agriculture is practiced in the bottom land and is protected from the seasonal floods by a fairly adequate system of dikes and diversion channels. No evidence of prehistoric irrigation works is present. The flow of the southern rivers is seasonally very great and ample evidence of flooding over the years can be seen. The riverbanks themselves are devoid of the gently sloping quebradas which afforded so many favorable building sites in valleys farther north. The width of the canyons is formidable, sometimes as much as 15 miles from rim to rim.

When one considers these geographical features, plus the fact that the distance from river valley to river valley is greater in this area than in any other of the Peruvian coast, a plausible explanation for the lack of archaeological data becomes apparent. Simply speaking, it is this: sites in the bottom land would have been subject to severe periodic flooding and there is no area suitable for settlements above the flood stage.

Undoubtedly, a thorough exploration of the region will yield evidences of Pre-Agricultural or "early hunter" occupation but it would seem that from this epoch to the Fusional, that is, during the Incipient-Agriculture, Formative and Regional-Florescent Epochs, cultural development of the Chala-Arica region did not follow the same pattern as that of the rest of the Peruvian coast. Of sites encountered and investigated almost all exhibited unmistakable signs of having been built no earlier than the Fusional or Tiahuanacoid Epoch.

A brief description of the sites (the site numbers used correspond to those on Fig. 106) examined follows:

Site 1. At Chala, 1½ kilometers south of the Hotel de Turistas in Chala to the west of the Carretera Panamericana, there is a rocky hill which descends precipitously to the sea. Along the northern and western edge of the hill there is an area of shell and refuse mounds. The area's dimensions are some 400 by 500 meters. Various mounds have been cut into for purposes of securing fill for the foundations of modern houses

nearby. The stratification of these mounds shows layers of shell and vegetable matter, punctuated by thick ash lenses; sherds are present throughout.

The ceramics, although somewhat similar to the Tiahuanacoid II and III ceramics of the Ica-Nazca region, are of a much poorer quality. The paste is thicker and the temper is coarser. All ceramics encountered were full-oxidized fired; no reduced firing being present. Brushed-ware was found in some quantity, but the main characteristic of the Chala ware is a yellowish to brownish color with simple Tiahuanacoid III motifs painted in black. Very little that could be identified as Tiahuanacoid II was found and no evidence of a later occupation than Tiahuanacoid III was encountered. There was no architecture. The conclusion would seem to be that here was a fishing settlement probably living in cane and clay or "wattle and daub" huts settled sometime toward the end of the Tiahuanacoid II period and being abandoned in Tiahuanacoid III.

Site 2. At kilometer 713 south there is a road 8-10 meters in width, stone-edged. Stones are well placed and well spaced and the road appears to have been one of some importance. It runs almost exactly due north and south but strangely enough, although it parallels the Carretera, was not encountered in recognizable form except in this particular area. For this reason and because of the construction, the author considers the road to have been of Tiahuanacoid rather than Inca origin. No sherds of any sort were encountered either on the road or in the vicinity.

Site 3. Three kilometers further south, at kilometer 716 of the Carretera Panamericana, was a series of stone quadrangles. These were in a fairly good state of preservation and the largest measures 10 by 14 meters. There are nine quadrangles, seven of which are situated in an arc running along the base of a low rocky ridge east of the highway; the remaining two are located some 100 meters to the west, overlooking the sea. No sherds were encountered either within the quadrangles or in the vicinity; however, both human and llama bones are present as well as vegetable refuse, making it fairly safe to assume that this was a living rather than a ceremonial site. The author got the impression from the site's proximity to the road mentioned above that this settlement probably had the function of a tambo. Above the seven quadrangles mentioned above at a distance of only 3 to 5 meters there are seven stone-lined storage pits. These are located at the south side of the main quadrangle. Five of the pits are open. Of these two are quadrangular and three are circular. Vegetable matter, including maize and yucca, is present. Two of the storage pits remain unopened and it is regrettable that lack of time and facilities prevented their investigation. Just above the row of storage pits there is a short flight of stone steps ascending the ridge and leading to the ruins of a small house, 5½ by 8 meters. The south wall of this house has three well made and well preserved niches.

From the construction of the quadrangles, especially the wall corners, plus the construction of the niches mentioned above, which was definitely non-Inca in style, plus the absence of sherds (a symptom which has become a fairly definite indication of Tiahuanacoid in valleys further north), the site is assigned to the Tiahuanacoid I or II periods.

Site 4. At kilometer 726, just north of Atico, there are a number of stone quadrangles located approximately 1 kilometer east of the Carretera Panamericana. These are much larger than those described above and are situated at the base of the first main range of Andean foothills. The quadrangles themselves are subdivided by stone and clay partition walls into a number of small rooms. No sherds are present. However, the architecture and construction bear a very strong resemblance to that of the Las Faldas site in Taruga Valley south of Nazca. This site was thoroughly investigated by Strong during his 1952-1953 expedition and also by Schaedel and the author in company with Strong in October of 1952. Las Faldas' first occupation appears to be Nazca B but the sherds associated with the stone quadrangles and rooms there appear to be all of the Tiahuanacoid II (Nazca Y) style and later. Site 4 is regarded as Tiahuanacoid II.

Site 5. At a point 2 kilometers west of the Carretera, between kilometers 749 and 750, there is another large series of stone constructions greatly similar to those described in site 4 above. These are accompanied by a large amount of terracing of the hillside at whose base they are situated. Observation of the site was conducted through field glasses as the situation and width of the road here did not permit leaving the car to investigate on foot; however, no salient differences in construction or architecture were noted.

Constructions of the same type were noted in inaccessible locations on the north bank of the Caraveli, some 3 kilometers from the Carretera — site 6 — and on the south bank of the Tambo — site 7. It should be noted here that the distance between sites 6 and 7 is very great and the lack of observable sites is most striking. Kroeber describes pottery and sites in the Siahuas-Vitor drainage as well as at the mouth of the Majes. It would be very easy not to be able to spot sites in the Siahuas-Vitor drainage but the author was puzzled at not locating the site at the mouth of the Majes. However, an explanation of this latter may lie in the fact that since Kroeber's writing a large-scale rice planting program has been going on in the Ocoña and Majes valleys toward their mouths. Further, at the mouth of the Majes a large pasture area has now been developed; it was populated, at the time of our visit, by a sizable number of what appeared to be fighting bulls. It may well be that Kroeber's site has been sowed over, but closer investigation, particularly of the pasture land, was, after serious consultation between Schaedel and the author, not considered advisable.

Even more puzzling is the general situation at the mouths of the Ocoña and particularly the Majes. Here are the only two areas in a distance of some 325 kilometers where building of settlements of some size would have been feasible. There are a number of places here on the shore side of the foothills where the slopes are gradual and suitable for building sites, having ample space above flood stage. And yet, although the route of the road permits ample and close inspection of this area, not one archaeological site was observed.

Fifty kilometers south of Moquegua another north-south road — site 8 — was investigated, the construction of which is similar to that described for site 2. It is, however, slightly narrower, its width ranging from 6½ to 9 meters. Some 10 kilometers of this road can be followed, after which it is obliterated by shifting sands.

Sr. Umberto Ghersi of the Museo de la Cultura Peruana described a large burial site near Ilo — site 10 — just south of the Moquegua River. The site, not visited, was described as two narrow strips of tombs, the two together totaling nearly 10 kilometers in length, and the ceramics proceeding therefrom fit closely Kroeber's (1944) description of Churajón style pottery from Arequipa as well as Uhle's description of the Atacameño II style from the Tacna-Arica area. Sr. Ghersi is endeavoring to secure several specimens of this ware from his family's collection and it is hoped to be able to publish photographs of these specimens at a future date. He has spent a good deal of time exploring this cemetery area and assured us that he has not encountered any ceramics which appear to him to pertain to any earlier epoch than the Fusional, a fact which ties in with our observations on other sites.

Just outside of Tacna is a site — site 9 — about which there is some doubt. Approximately a kilometer and a half north of the Plaza de Armas in Tacna, just to the west of the Carretera Central, there are a number of tapia walls, forming three quadrangles, each subdivided into rooms. The walls are in a fairly good state of preservation, about a meter and a half remaining above ground. The layout of the site, which measures 125 by 200 meters, is roughly similar to that part of Tambo Colorado north of the plaza. The site, however, is by no means as formal or as well preserved. An intensive search for sherds was made; none were encountered. The outer face of the walls has been coated with a thin coat of clay showing vestiges of simple red and yellow designs. The use of these colors plus the architectural arrangement suggest to the author that the site was Incaic in origin, and its location, which is a strategic one in the Tacna valley, strengthens this interpretation.

This, then, is the disappointing sum of archaeological sites readily available for reconnaissance in a distance of more than 700 kilometers of the south Peruvian coast. Doubtless, there are many other sites in the area, but from these observations we may certainly draw one firm conclusion; to wit, that any thorough archaeological exploration of the region will present a rather forbidding set of difficulties. This is true for a number of reasons: first, geographical conditions of the area are as inhospitable as any the author has seen in all of Peru with the possible exceptions of some of the remoter regions of the Sierra, particularly because of the extreme lack of water over great distances; second, the existing road conditions are execrable, and except on the Carretera Central, explorations will have to be carried on in trackless country; and third, existing accommodations, with the exception of Camaná, Arequipa and Tacna, are either primitive or nonexistent. The map here can fool one, as the three above-named places appear close together but because of road conditions are each a full and grueling day's journey apart from one another.

About the only archaeological conclusion that the author feels justified in advancing is that it seems that the first high-culture evidence in the area is that of Tiahuanaco. The lack of sherds makes it impossible to say whether this influence is pure Tiahuanaco, coming down from the Lake Titicaca region to the Tacna-Arica area and spreading northward, or whether it is the well-known coastal Tiahuanacoid of further north which apparently went from the Lake Titicaca region to Wari and thence spread to the coast and northward at least to the Chiclayo region. Suffice it to say that the Tiahuanacoid influence seems to be here in some strength. There is no evidence of early single-valley development or of a regional Florescent culture and the Inca influence does not show up nearly as strongly as the author anticipated it would. One of the strangest phenomena of the whole reconnaissance was the lack of post-Tiahuanacoid and pre-Inca manifestations; that is, those of the epoch of Kingdoms and Confederations, using Chimu, Chancay and Chincha as examples. This epoch in the other coastal regions of Peru has always been most productive of large archaeological sites and thickly settled areas.

It would certainly be foolhardy to say that thorough exploration of the region will be a disappointment in the long run, but it is certainly safe to say that here is an area in which the archaeologists' task will be no simple one and will necessitate years of hard work before the story of the Chala to Arica region is at all clear.

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May, 1953

AN ARCHAEOLOGICAL SURVEY OF CAVES IN WASHINGTON *

During a long period of the time when archaeological research was in progress in other areas of North America, the Columbia Plateau and western Washington lay relatively untouched and unknown. Only recently have systematic studies been undertaken by the University of Washington.

The archaeological survey of cave sites in Washington, during the summer of 1952, is a part of those studies. The plan was to locate as many caves as possible, to determine if they had been occupied aboriginally, and to evaluate them with an eye to future excavation.

Prior to the field work, reports had been received of caves in various parts of Washington, but the total was small, and we had little expectation of swelling the known number. Many of these had been learned of through newspaper clippings and letters, and from amateur activities. The problem, then, was not simply to examine a few choice caves for testing and excavation, but of surveying a large area in order to initiate an immediate program of excavation to save what remained. In addition to the survey of the caves, the University provided money for the examination of private collections.

The problem of surveying an area the size of the state of Washington obviated any kind of thorough testing. When a single isolated cave was found, an attempt was made to locate surface material, or, failing that, a shallow test of the cave site was made. Where caves were found in series, one was tested superficially; the others were examined for surface remains, similarities of deposits or features, and of talus. In some instances, previous excavations by amateurs provided evidence of occupation as well as a key to the depth of deposits. The result was a minimum of artifacts, but a maximum number (188) of caves examined. In addition, reports were received of others which could not be examined because of time. Excavation of the Meyer caves, near Ritzville, Washington by Robert Crabtree, followed survey in that area.

As a result of the survey, four major areas of occupation can be defined (Fig. 107): First, the largest, is the Columbia Basin, bounded on the north and west by the Columbia River, on the east by a section of the Palouse River, and on the south by Crab Creek. The second area is the Yakima Valley, including the Naches River; the third region centers around Asotin, Washington, along the Snake River, with a 25 mile radius north, west, and south. The last area has the Dalles, Oregon, as its center, with a 25 mile radius.

The survey was started in the western foothills of the Cascades, carried along both sides of the Columbia River and into the Yakima Valley, then southeastward, with the southernmost extent of the survey being reached at Miller Bar, in Hell's Canyon of the Snake River, about 100 miles south of Lewiston, Idaho. From there, the survey was carried northward to Trail, British Columbia, then west and south through the Sanpoil and Nespelem regions, and was concluded in the Columbia Basin.

* Financed by funds granted to Douglas Osborne for studies in Plateau anthropology by the Agnes H. Anderson Fund, University of Washington.

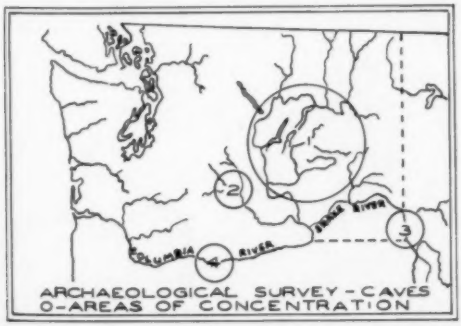

FIG. 107. Map of Washington showing areas of occupation of caves: (1) Columbia Basin; (2) Yakima Valley; (3) Asotin region; (4) the Dalles.

FIG. 108. Cordage from Trinidad Cave. *a*, 2-ply-Z-twist (single-S), 0.2 cm. diameter, loose-medium degree; *b*, 2-ply-S-twist (single-Z), 0.5 cm. diameter, loose degree; *c*, 2-ply-Z-twist (single-S), 0.8 cm. diameter, loose degree. All material cedar bark; length of *c* is 34.0 cm.

A number of observations can be made concerning the relationships of the caves to the physiography, geology, and ecology of the region. Caves were found in four of the seven physiographic provinces defined by Culver (1936) for Washington: The Okanagon Highlands, the Cascade Mountains, the Columbia Lava Plateau, and the Blue Mountains provinces. All four occupation areas are within the latter three provinces. Most interesting was the fact that 99 per cent of the caves were in Miocene basalts, a feature which, if known beforehand, could have saved many miles of travel.

The area surveyed coincides with portions of three biotic provinces of Dice (1943): Oregonian, Montanian, and Palusian. The last-named includes all four of the major occupation areas. Within this are three life belts, of sagebrush, bunch grass, and montane character. All four occupation areas are within the first two life belts. Occupation of caves, within the region surveyed by us, is rare outside of these two life zones, both of which include sunflowers in their floral associations.

During the course of the survey, it was found that stone artifacts were rare in the caves, relatively abundant on open sites, and extremely abundant in private collections. Of the few scattered tools found, most appeared to have been used either as choppers or hammerstones, though poorly made pressure flaked implements (scrapers) were also found. The tools produced by percussion techniques were relatively well made, and usually showed some secondary rolling. The quantity of stone gathered, however, is statistically insignificant.

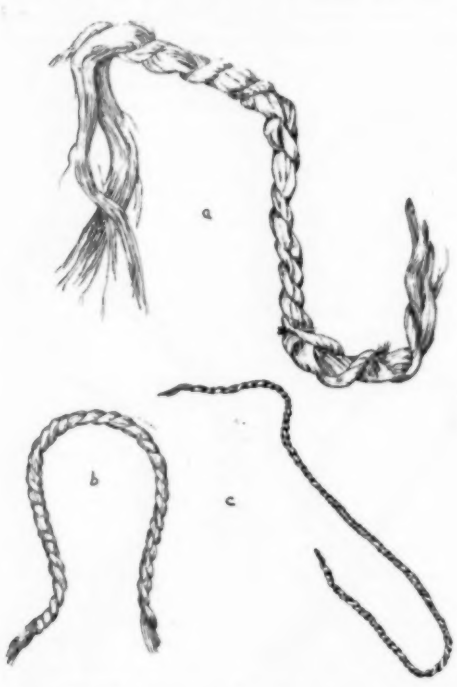

FIG. 109. Cordage from Trinidad cave. *a*, 2-ply-S-twist (single-Z), 1.5 cm. diameter, loose degree; *b*, 2-ply-S-twist (single-Z), 0.7 cm. diameter, medium degree; *c*, 2-ply-S-twist (single-Z), 0.3 cm. diameter, loose-medium twist. All material is cedar bark; length of *a* 35.0 cm.

In contrast to the stone, considerable perishable material was retrieved for analysis (Table 16). An analysis of the cordage, by Carolyn Osborne, showed some interesting regional differences. It was also compared with material described by Mills and Osborne (1952) from the Upper Coulee rockshelter in Grand Coulee. The largest quantity came from a cave near Trinidad on the west bank of the Columbia River. The bulk of the cordage is two-ply-S-twist with a single-Z-twist, with a few two-ply-Z-twist (single-S), and in addition, one specimen each of four-ply hawser and cable was found. The remarkable feature is that all of the 56 pieces are of cedar bark, 75 per cent of which are poorly separated fibres. The twist compares with that from the Upper Coulee, but there the two-ply-S-twist was invariably of *apocynum*, the two-ply-Z-twist of cedar; here, in contrast, all is of cedar. The next largest amount of material came from Cox cave near Vantage, where a higher per cent of the cordage, in contrast to the other two caves, is two-ply-Z-twist. Furthermore, it is of *apocynum* fibre for the most part, cedar being used in the two-ply-S-twist.

Other cordage was collected from the Basin, and suggests certain regional differences, though numerically inadequate. In the Northwest portion of the Columbia Basin (Grant County), the material is cedar and apocynum, in the central portion (Lincoln County), tule, and in the southeast (Franklin County), grass.

Other perishables included sewed cattail matting from Trinidad and Cox caves, twined tule and grass matting from Trinidad cave, a twined apocynum bag from Grant County, and coiled basketry from Trinidad cave. Although the perishable material is stratigraphically un-

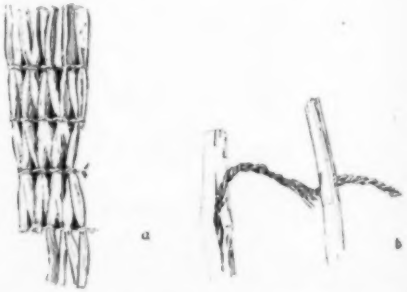

FIG. 110. *a*, twined tule matting; *b*, sewed cattail matting, cordage, 4-ply-S-twist (2-S, single-Z) hawser. Height of *a* 11.3 cm.

differentiated, and regionally unknown for the most part, it seems likely that it will become a valuable descriptive and chronological tool.

Of the few faunal remains, most were either deer or antelope, the latter being positively identified as far west as Moses Coulee, and possibly on the Columbia near Vantage.

The number of occupied caves, the apparent associations with life zones, the extent of amateur damage, and regional differences in cordage indicate that the Columbia Basin is the area that should first be explored. As a result, the University of Washington carried on excavations near Vantage during the summer of 1953 and will again in 1954.

TABLE 16

CORDAGE ANALYSIS

Trinidad Cave

Direction		
2-ply-S-twist (single-Z)	46	(Fig. 108, *b*, Fig. 109)
2-ply-Z-twist (single-S)	6	(Fig. 108, *a*, *c*)
4-ply-Z-twist (2-S, single-Z)—cable	1	
4-ply-S-twist (2-S, single-Z)—hawser	1	(Fig. 110, *b*)
1-S-twist	1	
1-Z-twist	1	
	56	
Degree		
Loose	20	
Loose-medium	21	
Medium	15	
	56	
Diameter		
0.1-0.5 cm.	19	
0.5-0.7 cm.	24	
0.7-1.0 cm.	11	
1.3-1.5 cm.	2	
	56	

Material: all cedar (megascopic examination)

Separation: 25% well separated; 75% just strips

Other Perishables

3 pieces sewed cattail matting — splitting (Fig. 5b)
1 piece twined tule matting — openwork (Fig. 5a)
2 pieces twined grass matting — openwork
5 pieces coiled basketry — all single rod foundation, split stitch, imbricated design, braided rim.

Cox Cave

Direction		
2-ply-S-twist (single-Z)	5	
2-ply-Z-twist (single-S)	8	
2-ply-S-with third single-Z added at end	1	
1-Z-twist (separated from 2-S??)	3	
	17	
Degree		
Loose	8	
Medium	9	
	17	
Diameter		
0.1-0.3 cm.	12	
0.3-0.5 cm.	5	
	17	
Material		
Cedar	8	
Apocynum	9	
	17	

Other Perishables

1 piece sewed cattail ma ting

Other Columbia Basin Cordage

Direction		
2-ply-S-twist (single-Z)	3	
2-ply-Z-twist (single-S)	3	
	6	
Degree		
Loose	3	
Loose-medium	1	
Medium	2	
	6	
Diameter		
0.2-0.5 cm.	4	
0.5-0.8 cm.	2	
	6	
Material		
Cedar (Grant County)	2	
Grass (Franklin County)	2	
Apocynum (Grant County)	1	
Tule (Lincoln County)	1	
	6	

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FOUR BURIALS FROM THE COEUR D'ALENE REGION, IDAHO

This is a report of four burials recovered from the Coeur d'Alene area, Kootenai County, north Idaho, in minor salvage operations.

10Kt1 (b-1). During the fall of 1949 construction workers on the North Idaho Junior College campus in Coeur d'Alene unearthed one burial. Workmen turned over the skull and longbones and a large iron blade into a box, to the Junior College. There was some green patination on the back of the skull, as if it had been in contact with copper. The blade or point measured 13.6 in. by 2.9 in., and was slightly under 0.3 in. in thickness. It is reported to be a type common in the trade material in the Plateau. Position and orientation are not known.

Roselake Burial. In the spring of 1950 a retired resident of Roselake, Idaho, discovered a skull and some longbones weathered or scraped out of the bank of the Coeur d'Alene River, at Roselake. Associated with the burial were tubular beads made of rolls of sheet copper 3.5 in. to 4.5 in. in length, strung on strips of rawhide (preserved by the copper), with strings of glass beads

wrapped spirally around the copper beads. Small bits of fine fur were adhering to the copper. The bones and beads were sent to the county coroner, William Wood of Coeur d'Alene, who passed the find on to the Junior College. Position and orientation are not known.

10Kt5 (b-1). In 1950 a group of glacial boulders, individually 5 in. to 10 in. in diameter, was observed at Ross Point, near Post Falls, Idaho. These were packed tightly together, about 20 feet from the edge of a bluff overlooking the Spokane River. The stones were partially obscured by settling into the clay, plus a covering of pine needles. This was presumed to be a burial marker, and the information was filed at the Junior College.

Later the marker was discovered after a small forest fire had burned off the pine needles. The finders supposed the marker to be connected with buried treasure and dug through the burial looking for it. When the Junior College was notified only the skull was left *in situ*. It was cleared and photographed. Fragmentary bones, possibly phalanges, were observed beneath the skull. The burial was reportedly about 27 inches below the surface, flexed, on the left side, with the head to the southwest, which is downstream of the Spokane River at that point. Apparently there were no associations other than the marker.

10Kt21 (b-1). In 1950 a resident of Medimont, Idaho, brought to the Junior College the skull which he had removed from a sandpit in a ploughed field on his farm, which is near the shore of Cave Lake, between the lake and the nearby Coeur d'Alene River. The spot where the skull had been removed was left alone until the rest of the burial could be properly excavated. In 1951, the burial was excavated, photographed, and sketched. Some of the bones were of the consistency of burned paper, but dried hard in the sun. The burial was 21 inches from the surface in a fill of unstratified sandy soil, just below the plough line (marked by humus). The sand was lakeshore deposit. This burial was flexed, on the back, with the legs to the right. The head was arranged to the west, which is downstream of the Coeur d'Alene River. A kneecap and some phalanges, apparently part of the burial, were found disturbed, in the same stratum but 3 to 8 inches from their original location. The head was apparently higher than the rest of the body, but the original position had been lost. One of the bones of the right forearm was broken, the break being discolored by the soil, but it is difficult to say just when the break occurred.

Many of the ribs were broken and folded back into the chest cavity. The left hand and wrist were entirely missing although the bones of the forearm were perfectly preserved. The right hand may also have been missing. The skull showed no signs of violence.

Under the left elbow of this burial was a piece of decayed wood 17 inches long. There was elusive evidence that the burial was wrapped in skin or matting.

Rodger Heglar, of the University of Washington, has made osteological analysis of the burials. His metric comparisons show the specimens to be well within the range of the Upper Columbia skeletal material, with dental wear typical of Plateau peoples, the most wear on the first molars. Periapical abscesses were present in two cases and a possible peridontal infection in another, which he reports is common in the Plateau. None of the usual arthritis was noted, and no cranial deformation. The stature of the only complete measurable skeleton was 162-164 cm., reportedly well within the Upper Columbia range. Where information was available, burials appear to be flexed with the orientation possibly related to the direction of flow of the nearest river.

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Fig. 111. Blade associated with 10Kt1.

COMMENT ON A. C. SPAULDING, "STATISTICAL TECHNIQUES FOR THE DISCOVERY OF ARTIFACT TYPES" *

First let me say that I am thoroughly sympathetic to all efforts toward development of more accurate methodology. But the application of statistics and other techniques to our problems, without regard for basic culture theory, cannot be regarded as an advance in technique.

For years there have been arguments as to whether cultural types — pottery types to be specific — were pre-existing units in culture history that could be discovered by a good archaeologist and missed by an incompetent one. I have been on the negative side in these debates — which arise, it seems to me, because people are talking about two different things.

It is well known that any given culture is a classificatory device which offers its bearers patterned ways of meeting the problems of existence. Not only are

* *American Antiquity*, Vol. 18, No. 3, 1953.

there categories of correct ways to dress, dance, talk, and solve the mother-in-law problem, but also there are proper ways to manufacture food vessels, water containers, cooking pots, etc. This is the patterning that is found imposed on the sherds in any time level in a village dump. The degree to which cultures allow variation in patterning varies widely from one culture to another; at different times; and from one aspect of the culture to another. The flexibility of the styles in Weeden Island is in contrast to the rather rigid patterning of Caddoan or Mississippian ceramics.

Spaulding's suggestion that statistical analysis of the patterning to be found in a collection from a village site will establish pottery types useful in study of culture history is amazingly naive. It will reveal the relative degree to which the people conformed to their set of ceramic styles at one time and place, but that is all it will do. Whether this information about ceramics is worth the work, I hesitate to say. However, it should be pointed out that Spaulding is advising the use of data in which variation due to the degree of conformance to standards is welded to variation due to style change with time. Such studies could be better made after the chronology is controlled.

'The search for the natural units in culture history, which still haunts the work of archaeologists, is directly analogous to the early 19th century biologist's faith in immutable species following one another in orderly procession down the misty corridors of geological time.' Surely it is time we progressed beyond cataclysmic archaeology where deposits representing each period are separated by layers of clean white sand. We now have techniques by which cultural development can be studied.

Patterning is not the central problem of typology, rather it is the framework in which the problem of setting up measures of time-change and geographical space-change of each unit of the pattern have to be solved.

To try to make this clear, I will discuss an actual situation. It is well known that a ceramic association consisting of a grit-tempered ware with a range of conoidal-base shapes and cordmarked decoration forms a fairly stable unit of the patterning that is found at a number of village sites in the northeastern United States. Let us make the entirely unwarranted assumption that we can view the distribution of this association of features at the year A.D. 700. As we cross geographical space to the southward, it will be seen that change took place in the "mean" — or we might say "ideal" — about which the actual specimens cluster. In Kentucky and Tennessee, grit is replaced with sand tempering; clay tempering appears in northern Alabama, and becomes the rule in the lower Mississippi Valley. Form changes from conoidal to rounded to flat base. Similar minor changes can be seen in the application of the surface finish.

Change of these associated traits tends to be gradual as space is crossed, and there is a good reason — which need not be detailed here — why this should be so. There are no inevitable, necessary breaks which will force the classifier to cut this ceramic distribution into segments. However, diffusion does not operate unaffected by other factors. When enough information is available, it will doubtless be found that rate of change in this pattern unit across geography was speeded up by competition with other cultural forms or by natural, political, or linguistic boundaries. Also, change was probably slowed by movements of people, or routes of easy communication.

After chronology is well under control, it may be possible occasionally to associate recognizable units of ceramic pattern with tribes as Ritchie and MacNeish have recently done. However, there is no inherent reason why such divisions must coincide.

Similar change can be seen in the cordmarking tradition as it is viewed through time. For example, there is a drift from large to fine cords. Here, too, there were doubtless periods of acceleration and deceleration in change due to a variety of possible factors. However, there are no natural inevitable factors operating that will establish neat segments in this change. Replacements of populations will cause sudden breaks in the culture history of Fulton County, Illinois, but that is another matter.

To set up historically useful type units in a tradition such as is represented by cordmarked pottery, I can see no way to avoid detailed comparisons made site to site and through time. Also necessary is a wary awareness that it is the date and geographical position of the site which you chance to dig that give the association of features that look so significant. Had your site been a hundred miles to the north and a hundred years earlier, "Klankenburg Cordmarked" would have been slightly different — a category into which one could place only about half the sherds now called by that name.

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May, 1953

REPLY TO FORD

Ford's objections to the ideas advanced in "Statistical Techniques for the Discovery of Artifact Types" appear to revolve around (1) the notion that use of such techniques somehow constitutes a denial of continuous variation of culture in time and space and (2) certain implicit definitions of such terms as "artifact type" and "historical usefulness" which in effect make their use the exclusive prerogative of the archaeologist engaged in inferring chronology by ranking sites or components of sites in order of likeness as judged by relative frequency of attribute combinations. I shall attempt to show that the first objection is a gratuitous error and that the second is no more than a semantic quagmire.

The issues involved can be clarified by describing three levels of organization of artifacts with respect to the

attributes which they exhibit. I wish to point out in advance that the result of classification at each of these levels has been called an artifact type, and that the levels have an orderly logical relationship to each other. This relationship is lineal; each level represents an elaboration of that immediately preceding it by the addition of new concepts.

Level I is the primary organization of the empirical data, which are the artifacts or fragments of artifacts in an archaeological assemblage. Operating procedure at this level consists of observing and tallying the attribute combinations present. If, as is frequently the case, the researcher plans to conduct comparative investigations by means of these attribute combinations, the tallies are expressed as proportions in order to provide commensurate data. A type at this level is a group of artifacts linked by the possession of a specific attribute combination which someone chooses to call a type.

Level II is an elaboration of the data provided by the Level I classification; the combination counts of Level I are analyzed to provide the total frequencies of each attribute noted, and the relationship of these attribute frequencies to the combination counts is investigated to provide information on the amount and nature of attribute clustering present in the assemblage. A type at this level is a group of artifacts exhibiting a consistent and distinctive cluster of attributes.

Level III is in turn based on the data of Level II, but adds the attribute of function to the attribute clusters of Level II. A type at this level consists of a group of artifacts exhibiting a cluster of distinctive attributes and having a distinctive function or functions. In the case of archaeological data, the function in most situations must be inferred from the attribute clusters of Level II by means of attributes which are not physical characteristics of the artifact (provenience, for example) or by imputing function on the basis of ethnographic analogy.

In order to avoid confusion here, the classificatory entities of Level I will be called simply attribute combinations, those of Level II attribute clusters, and those of Level III functional types. The major purpose of my paper was to suggest suitable techniques for discovering the amount and nature of attribute clustering in any archaeological assemblage — in short, how to perform the characteristic operations of Level II. It was further suggested that the definite attribute clusters isolated by these techniques were artifact types, i.e., corresponded closely to a general idea of the signification of the word "type." I supposed that an especially valuable feature of types so defined was the fact that they included inferences as to the behavior of the makers of the artifacts, in contrast to the boldly empirical attribute combinations so often called types (and even dignified by a "Binomial System of Nomenclature"). The attribute clusters are "natural" units in the sense that they represent a special effort to infer the behavior patterns of the makers, not the particular needs of an archaeologist working on a particular problem.

These preliminary remarks lead up to the semantic question mentioned in the first paragraph. Ford's comments, although never rising to the level of a coherent definition of what he means by an artifact type, indicate that in his view an artifact type is something which cannot be delineated on the basis of data from a single society over a restricted period of time, thus neatly excluding the possibility that our current knowledge will allow us to describe the artifact types of our own culture in 1953. Dismissing this result as nonsensical, I move on to infer that on the positive side a Fordian artifact type is "historically useful" and that an attribute cluster is not. Unfortunately, we are not favored with an intelligible statement of what is meant by historical usefulness, but it is plain that it has something to do with site to site comparisons extending through some undefined segment of time. Ford's default leaves a clear field for my own definition of historical usefulness: I would argue that any reasonably consistent and well defined social behavior pattern is historically useful, i.e., meaningful in assessing similarities and differences between any two components. The major purpose of my paper was to explore techniques for discovering consistent and well defined behavior patterns, and if the techniques actually do what they are supposed to do they cannot fail to yield historically useful units. The crucial point is adequacy of sample, not occurrence at 2 or 20 or 200 sites.

The alleged incompatibility of attribute clusters and a situation of continuous cultural development (disregard for "basic cultural theory" in Ford's terminology) can be dealt with simply. The methods I described are supposed to be an efficient process for discovering and describing the attribute clusters in any archaeological assemblage, and are nothing more than that. No suggestion was made that any statistical operations would disclose the ultimate significance of the clusters described; significance depends on the nature of the assemblage. The clusters may be the product of contemporaneous patterning, or of a systematic shift in styles over a considerable period of time, or the result of mixture of two more or less discrete cultural traditions, or combinations of these and other factors. Judgment of significance is primarily a matter of interpreting the nature of the archaeological deposit, which, even in the case where a single tradition is involved, can range from the group of projectile points imbedded in the Naco mammoth to the meters of continuous deposit found at some southeastern sites. But the attribute clusters are an excellent device for describing the outcome of such judgment in culturally meaningful terms. Formal recognition of transitional combinations (those differing by only one attribute from each of two distinct types) is particularly helpful in the exposition of continuous cultural change. I would like to make the malicious observation that the pottery attribute combinations used in site-to-site comparison by Ford fail to disclose ultimate significance in precisely the same fashion and to the same degree as do the attribute clusters, and to query Ford as to whether or not the

binomial southeastern pottery types should be abandoned forthwith on the ground that they disregard basic cultural theory.

At this point, it seems more profitable to abandon debating tactics and go to what I take to be the root of Ford's dissatisfaction with the attribute clusters (he has not challenged the validity of the techniques used to discover the clusters). This root is simply the fact that the attribute clusters are obviously not identical with the pottery types used by southeastern archaeologists and hence, in Ford's reasoning are certainly not pottery types, and moreover are probably not good for anything else. The southeastern types are attribute combinations which have been found to be useful in ranking components in order of likeness for the purpose of inferring relative chronology; usefulness here means occurring in varying proportions at several sites (Phillips, Ford, and Griffin, 1951, pp. 61-66). Although this point of view has been criticized above, the argument can be summarized by pointing out that (1) inferring relative chronology is not the sole objective of archaeology, the problem of description of assemblages in terms of patterns of human behavior being equally important; and (2) the attribute cluster with its explicit investigation of patterning has a somewhat better claim to the name "type" than does the attribute combination (the functional type has the best claim of all). By way of comment on statement (1), it might be asked whether anyone has shown that simple attribute counts would not discriminate sufficiently well between components to permit ranking; if they can discriminate, the Fordian type is both an inefficient tool for inferring chronology and an incomplete descriptive tool without any cogent reason for existence. The dispute over names mentioned in (2) is trivial, although it is certain that some confusion in classification has resulted from calling attribute combinations "types" owing to a more or less inchoate recognition that the word does imply patterning. If any semantic boundaries are to be set, clearly the functional type is entitled to the label, the attribute cluster probably is, and the attribute combination is probably out of bounds. I should add that I do not favor setting any boundaries by legislation; I am quite willing to let Ford have his types if he will let me have mine. The important thing is to be explicit about what kind of type one is talking about.

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AN UNUSUAL MASONRY WALL IN A KAYENTA ANASAZI CLIFF SITE

Located in deep, narrow limestone canyons draining into the Little Colorado River in the vicinity of Wupatki Basin in northern Arizona are numerous small masonry-walled cliff ruins. While these were apparently occupied at the same time as the large pueblos now included within the boundaries of Wupatki National Monument, they are little known and have not previously been reported upon except in the archaeological surveys of the Museum of Northern Arizona.

One of these sites, N.A.3940, situated with a southern exposure some fifty feet above the floor of Antelope Canyon, is of interest in that the masonry courses are laid in beds of grass rather than with the usual adobe mortar. The ruin itself is located in a shallow overhang in the Kaibab limestone cliff and contains but three small rooms. In no place do the walls remain standing over three feet, and along the front they have almost completely deteriorated. On the surface of the fill inside the rooms only a few corn cobs and four sherds were found. The latter, Moenkopi Corrugated, Flagstaff Black-on-white, Walnut Black-on-white, and Sosi Black-on-white, would indicate a short occupation of the site during Pueblo III times, some time between A.D. 1100 and 1200 (Colton and Hargrave, 1937). No trash accumulation was observed.

The masonry was composed wholly of blocks of Kaibab limestone and the grass, which was identified (by comparison with specimens in the Museum of Northern Arizona herbarium) as *Andropogan sp.* This grass was laid across the entire width of each course, rather than merely being "chinked" in the crevices (Fig. 112). In most instances, whole clumps were placed in parallel rows, forming a more or less plastic base upon which the blocks could be set. There were no indications of any use of mud in association.

One obvious reason for this use of grass instead of mud is the apparent absence of adobe in this limestone area. Even the floor of the canyon would have been covered, at the time of occupation, with a layer of

FIG. 112

black volcanic ash from the eruption of Sunset Crater (Colton, 1945). Since the walls at no time were higher than four to five feet, the inhabitants perhaps found it more expedient and just as functional to use the grass, which undoubtedly grew in the immediate vicinity. Of interest, also, is the statement of a Third Mesa Hopi informant regarding the similar construction of windbreaks in Hopi farm plots. Frequently, lines of rock, two courses in height, are placed in fields to protect crops from blowing sand. These low walls are sometimes laid in beds of green grass, because the manufacture of adobe would use too much valuable water. It is reported that, because of the resiliency of the fresh grass, this material served very well as a base for a wall of only a few courses.

So far as the author is aware, only one other instance of a corresponding use of grass without mud has been recorded. Martin (1933a, p. 10; 1933b, p. 9) reported "fibre-chinked slab cists" from a cave on Pommel Peak in the Chisos Mountains of Texas. Since he gave no additional data, no further comparison is possible.

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THE DEEP-BASINED METATE OF THE SOUTHERN CALIFORNIA COAST *

Deep-basined metates are frequently found in early sites on the southern California coast, but the faces of the accompanying manos usually are only moderately convex. Mano faces examined by the writer never have been sufficiently excurvate to make contact with the grinding surfaces of the deeply ground metates. This presents an interesting problem: how were the manos manipulated on the metates?

An examination of specimens from Oak Grove sites 7, 21, and 79 (Rogers, 1929) and the Smithsonian Institution River Basin Surveys' sites 4SBa477 and 4SBa485 in Santa Barbara County, California, reveals the following associations and characteristics. Slab, shallow-basined, and deep-basined metates are found in association. The first two types exhibit an unbroken grinding area, but specimens of the latter almost invariably have a slight shoulder running at least a part of the way around the basin, the transition between a slightly concave ground area and the deeply ground cavity. Striations are common and are always longitudinal, attesting to the use of a to-and-fro motion. In all but a few instances the grinding surfaces are sharpened by pecking. Associated with the metates are monofacial and bifacial manos with unground edges, and bifacial manos with ground edges (Fig. 113, *e*). Transverse striations on both the edges and faces indicate that the motion was perpendicular to the long axis of the mano and of the to-and-fro type. A definite beveling of opposed sections of the edge of the mano (Fig. 113, *e*, 2) is found, but it occurs less frequently. Sharpening by pecking appears on some of the mano faces and occasionally on ground edges.

These points suggest the following as a possible explanation of the grinding procedures employed. The metate in its earliest phase was of the slab type (Fig. 113, *a*), and grinding was carried on in a to-and-fro manner until a shallow basin (Fig. 113, *b*) was formed. Manos were oval cobbles (either shaped or unshaped) at first and usually developed two relatively flat, well-worn faces. When the metate had acquired a shallow basin, an important change might be made. The mano could be turned up on its edge, the former grinding faces perpendicular to the long axis of the metate, and grinding continued in a to-and-fro manner forming a deep basin in the metate (Fig. 113, *c*). It will be noted that the curvature of the mano edge is much more pronounced than that of the mano face. Since the most extensive wear frequently centers at points on the edge about midway between the extremities of the transverse and longitudinal axes of the mano, it appears that the hand stone was held so that the long axis was at about a 45 degree angle to the face of the metate. After a deep basin was developed, an additional movement of the mano seems to have been practiced although its employment was by no means frequent. It consisted of manipulating the mano with a to-and-fro motion with the face of the mano parallel to the plane of the metate but with the long axis of the mano at a 30 to 45 degree angle to the long axis of the metate (Fig. 113, *d*) thereby beveling opposed sections of the edge. Since this practice is not particularly suited to grinding it is quite possible that the beveling was primarily accidental and that the movement was made for some other purpose, for example, to mash down or level off the grist in the basin. It is interesting to note that wear areas on some manos indicate that the mano frequently had been rolled from this horizontal position to the vertical edge-grinding position. Edge grinding was continued until the metate was discarded.

The weakest link in the explanation given above is the extent of the edge grinding evinced by the manos.

* Published with permission of the Secretary of the Smithsonian Institution.

While edge grinding occurs frequently and the proportion of manos to metates is high, the amount of grinding on each mano does not appear to be as great as one might expect from the size of the metate cavities. It may be that frequent sharpening of the grinding surface of the metate accelerated the development of a deep basin. Or the basin may have been partially pecked out although no certain indication of this has been noted thus far.

Rogers has explained the use of these implements somewhat differently. He suggests that the grinding was accomplished in the deep cavities by using two manos simultaneously (grinding with their faces), one along each side of the basin. The greater number of oval manos he considers to be intentionally shaped although he believes some "elongate, squared billet" type manos to be the result of edge grinding (personal communication; Rogers 1929, pp. 349-52). In the writer's opinion this viewpoint does not satisfactorily explain the smoothly ground bottoms of the metate basins; if the two manos were used high enough on the sides of the basin to contact the metate with their relatively flat faces, they would tend to leave a central ridge. If the manos were used far enough down in the basin to prevent the formation of a central ridge, their faces would have to be much more convex than they are. Rogers' views also leave unexplained the presence of occasional sharpening on mano edges. Recent excavation by River Basin Surveys in the Cachuma Reservoir area indicates that the "elongate, squared billet" type mano mentioned by Rogers is a later type not properly associated with the oval manos and deep-basined metates in general and not suited for use in deep-basined metates because of the relatively plane faces of the manos.

Inasmuch as the writer has heard suggestions of the use of a rotary motion in these metates, it would probably be wise to emphasize again the fact that the striations on both the metates and manos definitely indicate a *to-and-fro* motion. Furthermore, it will be noted that in the Southwest and California there are very few

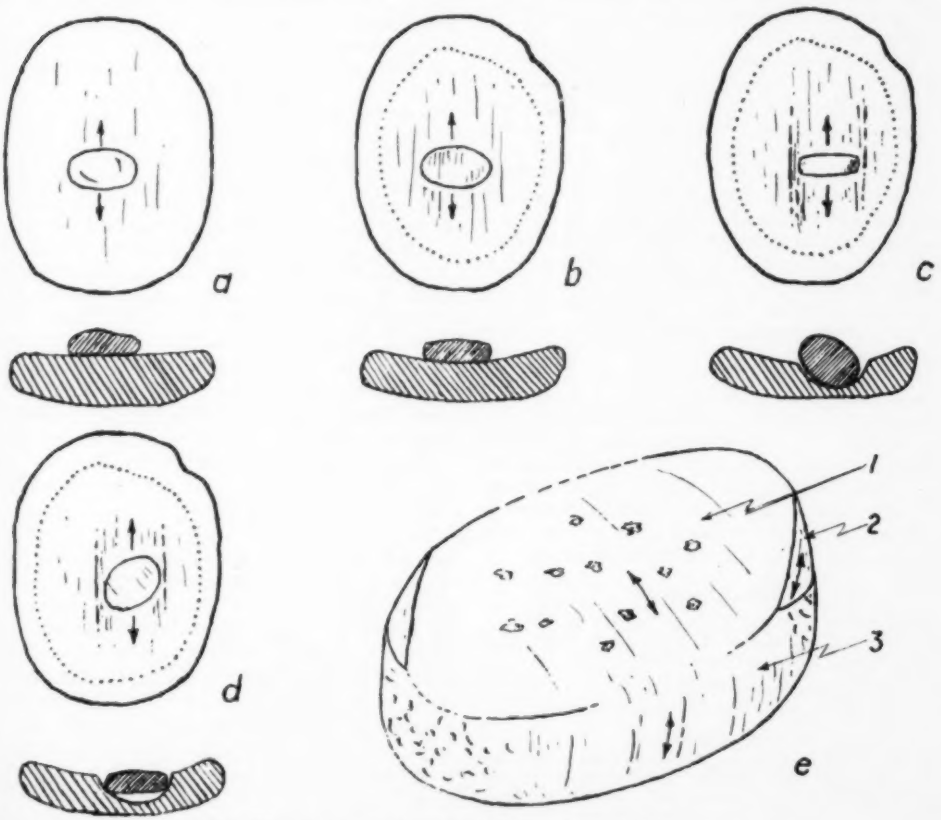

FIG. 113. *a-d*, mano and metate during various grinding stages; *e*, sketch of well developed mano showing 3 ground surfaces.

ethnographic reports of the use of a rotary motion or archaeological reports of it where supporting evidence is given.

At the present time little material is available from which to sketch the distribution of the mano and metate types described above and hence, also, a distribution for the proposed method of manipulating the grinding stones. In addition to Santa Barbara County, similar deep-basined metates are found in San Diego, Orange, Los Angeles, and Ventura counties, but their occurrence is probably somewhat wider both to the north and south. The distribution of the edge-ground, oval mano as a principal form does not appear to be coextensive with that of the deep-basined metate. For example, in Los Angeles County, several other mano forms appear to be more numerous. One collection of these is described in the report of the first season's work at Tank site (Treganza and Malamud, 1950, p. 144ff.). It is possible that the grinding pattern there had much in common with the one proposed for Santa Barbara, but, lacking a functional analysis of the Los Angeles County material, it is impossible to make a comparison at present.

If the development and use of these grinding implements has been accurately reconstructed above, it is significant in several respects. 1) Manos ranging from slightly used unshaped monofacial specimens to well-developed bifacial pieces with heavily ground edges may be merely stages in the development of a single type. Likewise, slab, shallow-basined, and deep-basined metates may be stages in a single type, although it is not implied that every slab or shallow-basined metate was necessarily destined to be a deep-basined one or every monofacial mano a bifacial one with a ground edge. 2) The frequent usage of the edge of the mano for grinding in deep-basined metates would be a rather distinctive cultural trait useful for comparative purposes. Thus deep-basined metates found in some of the early sites of the Southwest, such as those of the San Pedro stage of the Cochise culture (Sayles and Antevs, 1941, p. 24, Plate XV), if made in the manner suggested for the Santa Barbara specimens, would indicate an interesting relationship with some early southern California sites; on the other hand should the grinding methods be different, the fact that deep-basined metates are found in both areas would be of diminished significance.

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A PUEBLO I SITE AT GRAND CANYON

Archaeologists usually recognize four culture patterns in the Southwest: the Hohokam, Mogollon, Anasazi, and Patayan. Two of these groups, the Cohonina Branch, usually regarded as Patayan, and the Kayenta Branch of the Anasazi, were in contact along the southern side of the Grand Canyon. While the Cohonina specifically, and the Patayan culture pattern generally, are not yet clearly defined, certain differences between them and the neighboring Kayenta Branch Anasazi are apparent. The Cohonina finished their pottery by use of the paddle and anvil, instead of scraping and polishing it as the Anasazi did; both groups, however, used a reducing atmosphere for firing, which produced a gray ware. In architecture, the Anasazi were generally more advanced. Cohonina sites usually consist of scattered surface houses, often with ramadas nearby. The Anasazi lived mostly in permanent villages of pithouses and later surface structures of true masonry, and in distinction to their western neighbors, they built ceremonial rooms. In the making of stone and bone tools, as in architecture, the Anasazi were more advanced and produced a greater variety of tool types. Despite these differences, considerable trade and intergroup influence is evident between these peoples.

In the course of archaeological survey work in Grand Canyon National Park during the summer of 1952, a site was discovered which we thought might throw some light on these problems and accordingly, with authorization from the Director of the National Park Service, we investigated further. This site (Grand Canyon 505) is located about 200 m. west of the Wayside Museum of Archaeology and 20 miles east of Grand Canyon village. The canyon itself is about one-half mile to the north, while southward the land slopes off into one of many valleys draining the Coconino Plateau. Immediately west of the site is a low, cherty limestone ridge trending north and south. The principal ground cover consists of pinyon and Utah juniper, but smaller forms such as cliff rose, several kinds of cacti, yucca, and smaller perennials grow beneath the trees. Deer, rabbits, and squirrels are common game animals of the area today.

There are few surface indications of the site. The framework of a recent Navaho sweat lodge, tied at the top with baling wire, stands near the center of a small, thin trash deposit (Fig. 114). Test pits 50x50 cm. were dug in and around the trash area to determine the depth and nature of the trash and to explore for subsurface features. The trash deposit averaged about 25 cm. in depth, thinning toward the margins, and was composed of fragments of limestone and other rocks, flaked chert, and potsherds, in a matrix of sparse ash and organically stained sandy silt.

Two structural units were found. The principal unit consisted of a shallow, near-surface house, a group of storage pits, and two storage rooms with stone rubble wall bases. The second unit, about 5 m. east of house

1, was a small, roughly circular enclosure with a rubble wall base.

House 1 (Fig. 115, *a*) is a saucer-shaped depression, the center being about 25 cm. below the perimeter at the old ground level (Fig. 114). It is nearly circular, being 4.50 m. on the north-south axis by 4.00 m. on the east-west axis. The house had been built on a gentle slope, and as a result, the eastern margin of the depression was some 25 cm. lower than the western. No entry was located. The floor was not plastered but was well defined because the clay into which it was cut had been thoroughly packed and was, in addition, baked in the vicinity of the fire pit. The fire pit was a simple circular depression in the approximate center of the house. Thirty centimeters east of the fire pit was a rectanguloid depression filled with earth and lenses of grayish ash,

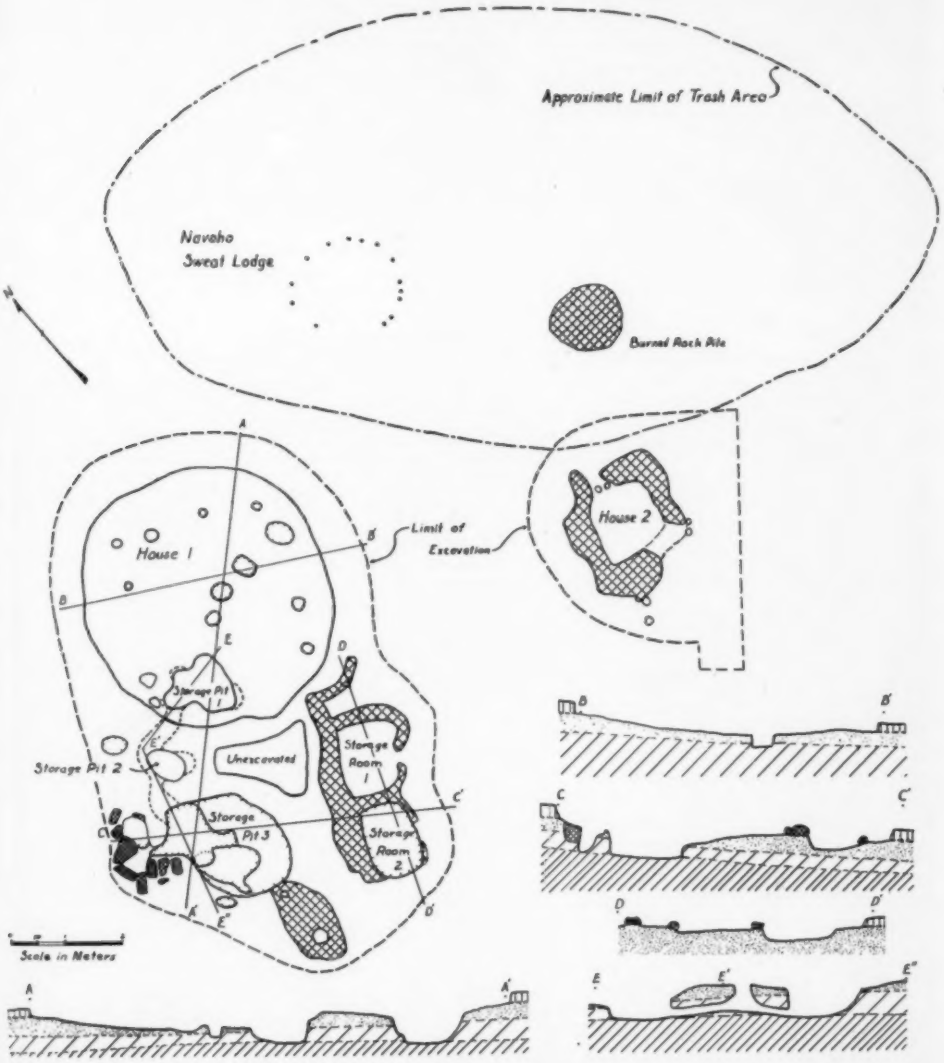

Fig. 114. Plan and sections of site GC 505. Vertical hatch=trash; stipple=clay; broad diagonal hatch=friable limestone; narrow diagonal hatch=crystalline limestone; cross-hatch=rubble walls; fine cross-hatch=boulders.

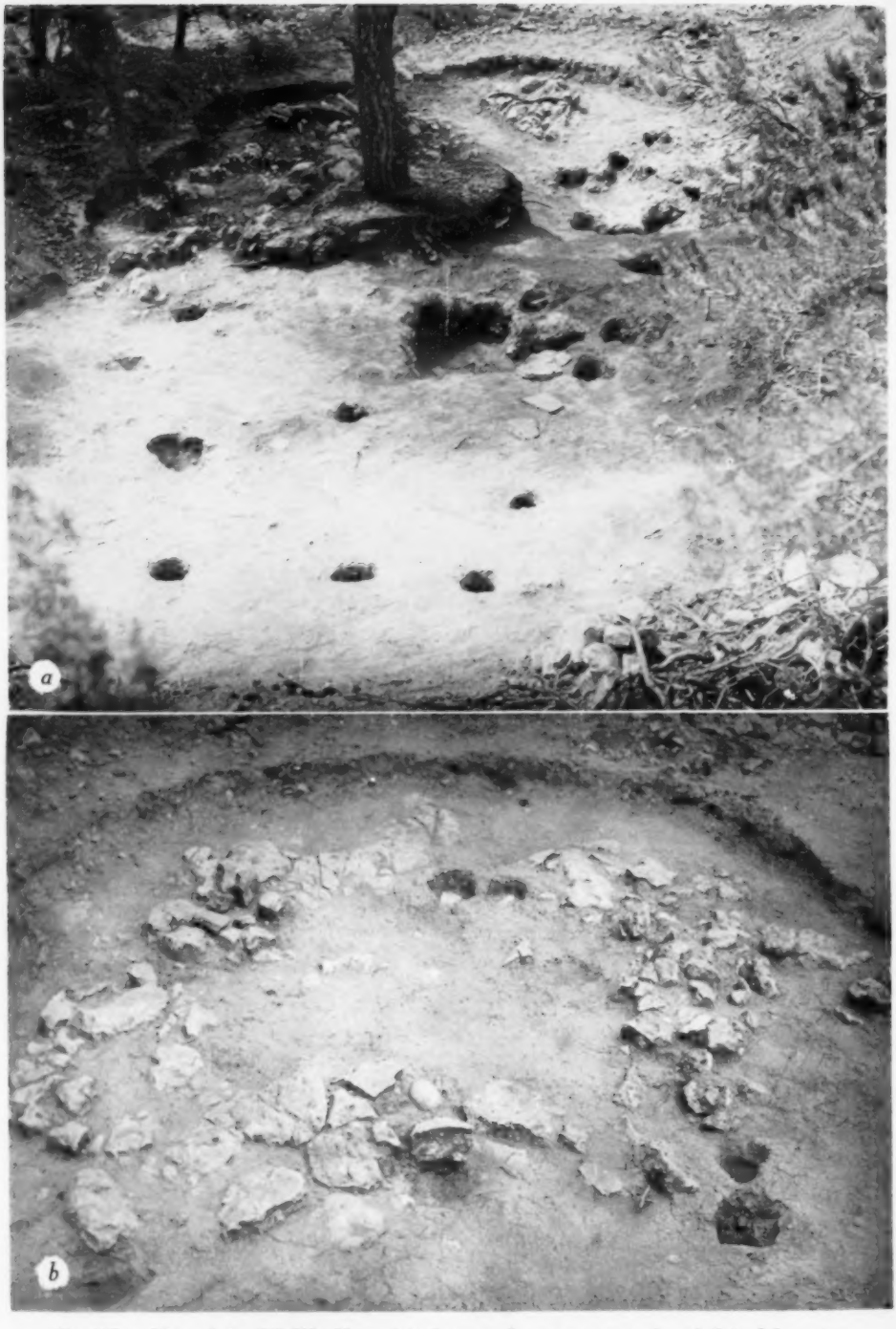

Fig. 115. *a*, View of site GC 505: House 1 in foreground; storage rooms 1 and 2 in left center; storage pit complex in right center; *b*, house 2, site GC 505.

apparently an ash pit. East of the ash pit and near the edge of the house was another pit, oval in plan. A series of postholes form a rectangular pattern inward from the margin of the floor. The placement of these suggests a rectangular roof framework with the walls slanting inward from the edge of the floor to the roof.

In the southwest part of the house is an irregularly shaped storage pit (No. 1), 1.15 m. across its major axes and 40 cm. in depth. This pit is cut through native clay and about 30 cm. of gritty, friable limestone, to the crystalline limestone bedrock which forms its floor. At several places the edges of the pit are undercut. About 50 cm. southwest of the house is another storage pit (No. 2) cut through clay and friable limestone to bedrock (Fig. 114). This pit is oval and also has partly undercut edges.

Southwest by south from this pit, and about 1.25 m. from the house, is a large, irregular pit (No. 3) excavated, like the others, to the crystalline limestone. The north and west walls of this pit are vertical. The west wall opens into a smaller pit walled on the west side, and partly divided into two sections, by vertically set angular boulders. This pit is also floored by bedrock. The eastern and southern borders of the main pit rise steplike to the top of the friable limestone and then slope gently upward to the old surface level. The clay surface, like that in the main house, is well packed from usage. A circular depression cut into the friable limestone at the inner margin of the pit may have served as a posthole.

A most curious feature of this group of storage pits is that they are interconnected by small tunnels cut through friable limestone at floor level or a few centimeters above. The tunnels average about 25 cm. wide by 20 cm. in height. They curve slightly, but it is possible to see from the center storage pit through the tunnels into each of the other pits. It is barely possible that these are solution channels, but their nature and placement, plus the fact that no others were found, make this highly unlikely. There does not appear to be any logical reason for them.

At the southern edge of the largest storage pit is a low pile of limestone cobbles and boulders. Two cleared spaces, one at each end of the pile, may have served as postholes, the rocks stabilizing posts against lateral movement. This raises the question of how the storage pit complex was roofed. A posthole in the center of the large pit was mentioned above. Another depression suitable for a roof upright was found 40 cm. northwest of the central storage pit. Other holes, if present, were not located, but part of the area was not excavated because of a large piñon tree. It is presumed that the roof, of whatever type it may have been, was tied in to the roof of the main house, since otherwise the tunnels between storage pits would have allowed passage of water when it rained.

South of the house and east of the large storage pit is a low wall composed of rubble piled up without mortar. This wall, oriented slightly east of north, is almost straight and varies in width from 30 to 50 cm. At its northern end it joins a narrow line of rubble which, for about 1 m., curves around the southeast margin of the house. This wall forms the western side of two small rectanguloid storage rooms outlined by similar but less wide rubble walls. Near the center of the east wall of each room is a gap in the wall base, but whether or not this indicates an entry cannot be determined. The floor of storage room 2 had been excavated to a depth of 20 cm., that of storage room 1 only about 5 cm. There was no indication of the method of roofing this structure, but the rubble wall base suggests that upper walls were in the nature of light screens held in place by, rather than based upon, the stones.

The same system of construction was followed in building house 2, the small circular structure east of the main house (Fig. 114; 115, *b*). This unit was about 2 m. in over-all diameter; inside the wall, the floor area was just over 1 m. in diameter. Three pairs of postholes were located about the perimeter of the rubble wall, forming a triangle. This suggests a tripod framework covered by matting, or something similar. A gap in the rubble on the southeast side probably marks the entry. The floor was well-packed native clay. Within the wall, just west of the gap, was a small depression containing a well-smoothed handstone. No other artifacts were found on the floor. While the purpose of this small house is not apparent, it does not seem to have been either a cooking shelter or a sweat lodge. One other possible use may be mentioned. Its size, location, and flimsy construction suggest that it may have served as a menstrual hut.

Although there was an abundance of chert in the limestone ridge west of the site, and even some evidence of quarrying, stone artifacts were relatively scarce. Most tools recovered were of materials foreign to the site but probably obtainable in the vicinity. Most were made by pecking and grinding, or else were by-products of utilization. These consisted of metates, manos, handstones, pestles, and both upper and nether abrading stones. Manos are here considered to be the larger but relatively thinner grinding stones, probably wielded by two hands, and used in metates for grinding corn, while handstones are smaller but thicker and appear to have been held in one hand and used for miscellaneous grinding on various kinds of grinding bases. Most of the flaked stone artifacts were found on the surface, but enough were recovered in the excavation to justify the belief that the surface material also derives mainly from the early occupation. Animal bone was relatively scarce. Deer, mountain sheep, and rabbit are represented by perhaps half a dozen bones from the fill of house 1 and storage pit 3. Only two bone implements were found. Artifacts of stone and bone are summarized in Table 17.

Slightly more than 1,200 sherds were recovered from site GC 505. Of these, 841 derived from excavation; the others were from the surface. No whole or restor-

able vessels were found. Table 18 gives number, distribution, and percentages of sherds by ware and type.

Analysis of Table 18 shows that 72.07 per cent of all excavated sherds are San Francisco Mountain Gray Ware, Deadmans Gray constituting the great majority. Next in quantity is Tusayan Gray Ware, comprising 20.20 per cent; then Tusayan White Ware, 5.94 per cent; and finally, San Juan Orange Ware, which totals only 1.19 per cent. This complex clearly indicates that ceramically GC 505 belongs to the Cohonina Branch. This is also borne out by surface material. Nevertheless, nearly 28 per cent of Anasazi wares indicates considerable contact with Kayenta peoples to the northeast.

Because it is impossible to discriminate between body sherds of Lino Gray and Kana-a Gray, relative proportions of these types cannot be determined accurately. However, a few neck sherds of Lino Gray, as well as some of Kana-a Gray, show that both types were in use.

Only 8.56 per cent of all sherds are of decorated types. Although only 25.70 per cent of the Anasazi sherds are of painted types, these constitute nearly 78 per cent of all decorated sherds. Kana-a Black-on-white is the most common of these, Deadmans Black-on-red occurring only one-fifth as often. One sherd each of Sosi and Flagstaff Black-on-white came from the surface, and these probably are drift sherds from later occupation of the general area. Floyd* Black-on-gray, which comprises only 1.52 per cent, and Deadmans Fugitive Red, which constitutes 0.47 per cent of the total San Francisco Mountain Gray Ware, together represent 22.08 per cent of the decorated sherds.

In addition to the sherds considered above, there are a few which deserve special mention. One sherd of Deadmans Fugitive Red (Fig. 117, *h*), from the fill of house 1, bears a hatched band of fine engraved lines applied before the red wash was put on. Six sherds of a fine-paste unidentified gray ware (3 from the surface and 3 from the fill of house 1) formed part of a seed jar. Three small holes (2 mm. in diameter) were punched through the vessel wall from the outside, just below the rim. These may have been used in supporting the vessel, or may have been simply a decorative technique. Fragments of 7 jug or pitcher handles were found, 2 from house 2 and 5 from the surface. All were of Tusayan Gray Ware except one of Deadmans Gray. Six handles consisted of a single round or slightly flattened rod, one of a double rod.

Potsherds provided material for various small artifacts, as follows:

Perforated sherd discs (7). Three from fill of house 1, 3 from house 2, 1 from storage pit 3. Five were of Deadmans Gray, 1 (Fig. 117, *g*) of Floyd Black-on-gray, and one of an unidentified polished brown ware. All circular with smoothed edges, biconical perforation at or near center. Diameters from 3.4 to 5.3 cm.

Fragmentary sherd discs (5) not illustrated. Three from fill of house 1, 2 from house 2. Three were of

* Floyd Black-on-gray is a new designation, to be published by the Museum of Northern Arizona, for the earlier form of Deadmans Black-on-gray.

TABLE 17. ARTIFACTS OF GROUND STONE, FLAKED STONE, AND BONE.*

	OBJECT	NO.	PROVENIENCE	MATERIAL	LENGTH	WIDTH in mm.	THICKNESS	REMARKS
GROUND STONE	Metates, thin slab	2	Storage room 2 Storage Pit 1	Sandstone	350± 600+	256 84	28 18+	Edges shaped, trough closed at one end (Fig. 2, a); other used on both sides.
	Metatelike stone	1	Storage Pit 1	Sandstone	156+	114	15	Palette (?)
	Other abrading stones	4	House 1 fill	Sandstone	94±-155+	79±-86+	15-32	Oblong unshaped slabs; 3 uniface, 1 biface.
	Pans	1	Storage Pit 1	Sandstone	154	94	52	Uniface (Fig. 2, b).
	Handstones	2	Storage Pit 1 House 2	Quartzite Rhyolite	106 111	80 79	24 69	One is biface (Fig. 2, c); other is reused fragment of mano.
	Multiface handstone	1	House 1 fill	Quartzite	118	74	62	Four use facets (Fig. 2, d).
	Abrading stones	5	House 1 fill (4) Storage Pit 3 (1)	Sandstone	46-96	36-70	15-28	Three biface, two uniface; three have shaped edges. (Fig. 2, e, f).
	Hammerstones	5	Storage Pit 1 (2) House 1 fill (2) House 2 fill (1)	Chert (2) Quartzite (3)	56-84	35-59	35-59	Selected pebbles showing abrasion scars from use.
	Hematite pebble	1	Storage Pit 3	Hematite	60	70	40	Paint material (?).
FLAKED STONE	Projectile points Small; expanding stem	5	House 1 fill (2) Surface (3)	Chert (2) Jasper (2) Obsidian (1)	25	15	3	Straight edges, small barbs (Fig. 3, a).
	Small, lateral notch	1	Surface	Obsidian	24	17	4	Fig. 3, b.
	Medium; stemmed	1	Surface	Jasper	48	21	4	Fig. 3, c.
	Untyped fragments	2	Surface	--	--	--	--	
	Drills: expanding base flake base	1 1	Surface Surface	Flint Jasper	Ind. Ind.	12 8	6 4	Variant of "Cohonina point"? (Fig. 3, e).
	Graver	1	Surface	Jasper	30	16	3	Fig. 3, f.
	Blades, leaf-shaped	3	House 1 (1) Surface (2)	Jasper	Ind.	30-37	8-13	Percussion flaked with pressure retouch (Fig. 3, d).
	Flake knives	5	House 1 (2) Surface (3)	Chert	37-51	--	--	Random flakes, retouched from one or both edges.
	Side scrapers	5	House 1 (3) Surface (2)	Chert (3) Jasper (2)	32-58	--	--	Random flakes with high-angle scraping edge (Fig. 3, i, k).
	End scrapers	3	Surface	Chert	35-64	--	--	High-angle scraping edge at end (Fig. 3, l).
	Utilized flakes	5	Surface	Jasper (4) Obsidian (1)	20-30	--	--	Chipping resulting from use.
	Biface chopper	1	House 1 fill	Chert	61	64	40	Percussion flaked nodule (Fig. 3, m).
	Uniface chopper	1	House 1 fill	Chert	73	80	29	Percussion chipped primary flake (Fig. 3, n).
	Pulping plane	1	House 1 fill	Chert	59	71	45	Fig. 3, o.
BONE	Split metapodial awl	1	House 1 fill	Deer	103	--	--	Head unaltered except for splitting (Fig. 3, j).
	Worked scapula	1	Storage Pit 3	Deer (?)	Ind.			Cut and beveled edge polished from usage.

* In the column headed *Remarks*, citations to Figs. 2 and 3, refer to text Figures 116 and 117 respectively.

Deadmans Gray, 1 of Deadmans Fugitive Red, 1 of Tusayan Gray Ware. Because of the way in which these are broken, it is impossible to determine whether they were plain or perforated. Diameters from *circa* 2.8 to 7.2 cm.

Sherd scrapers or rubbers (6) not illustrated. Four from fill of house 1, 1 from house 2, 1 from storage pit 3. All made of Deadmans Gray. Working edge straight (5) to convex (1). Shape of 4 indeterminate, one truncated triangle, one rectangular with only one end worked. Size of only complete specimen: length, 4.6 cm.; width, 3.0 cm.

Briefly discussing the results of the excavation of site GC 505, we may turn first to architecture. Structurally, house 1 is quite similar to site NA 5166C (McGregor, 1951) in its general outline and in that it is a shallow saucer-shaped depression. It is some smaller, being about 5 m. in diameter, and has a more formalized pattern of roof supports. Furthermore, it is closely associated with surface and subterranean storage facilities. In the latter trait, perhaps, it more closely resembles the basic ideas, but not the structure, of site NA 2797 (Spicer, 1934). The interconnecting storage pit system of site GC 505 is peculiar to this site, not having been found elsewhere. Of all previously excavated structures, house 2 most closely resembles room 1, site NA 5159, in its small size, separate placement, and in the triangular posthole arrangement. However, the stone wall base cannot properly be called masonry, and the entire structure is smaller than room 1, NA 5159. GC 505 differs from sites NA 5159 and NA 5166C in showing evidence of single occupation over a period of time rather than a series of brief seasonal reoccupations. Together with the Baker Ranch sites dug by Spicer (1934), GC 505 suggests that the habitation pattern of the Cohonina may have been somewhat more stable than believed by McGregor (1951). Architecturally, GC 505 shows greatest resemblance to the earliest Cohonina houses encountered by McGregor (1951) and Spicer (1934).

TABLE 18. NUMBER DISTRIBUTION AND PERCENTAGE OF SHERDS FROM SITE GC 505. UNDERLINED FIGURES INDICATE TOTALS BY WARES.

POTTERY WARES AND TYPES	House 1		Storage Pits 2 and 3		Storage Rooms 1 and 2		House 2		Total of Excavated Sherds		Surface Sherds	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
SAN FRANCISCO MTN. GRAY WARE	334	76.82	31	51.66	25	86.20	221	69.53	611	72.07	219	60.25
Deadmans Gray	320	73.60	30	50.00	25	86.20	219	68.90	594	70.08	217	59.70
Deadmans Fugitive Red	4	.92							4	.47		
Floyd Black-on-gray	10	2.30	1	1.66			2	.63	13	1.52	2	.55
TUSAYAN GRAY WARE	62	14.10	25	41.47	3	10.20	80	25.06	170	20.20	89	24.44
Kana-a Gray	4	.92	17	28.30			10	3.14	31	3.68	14	3.84
Lino and Kana-a Gray body sherds	58	13.18	8	13.17	3	10.20	70	21.92	139	16.52	75	20.60
TUSAYAN WHITE WARE	35	8.06	4	6.66	1	3.44	10	3.14	50	5.94	53	14.52
Kana-a Black-on-white	35	8.06	3	5.00	1	3.44	10	3.14	49	5.82	43	11.79
Sosi Black-on-white											1	.27
Flagstaff Black-on-white											1	.27
White ware body sherds			1	1.66					1	.12	8	2.19
SAN JUAN ORANGE WARE	3	.69					7	2.19	10	1.19	3	.82
Deadmans Black-on-red	3	.69					7	2.19	10	1.19	3	.82
TOTAL	434	100.00	60	100.00	29	100.00	318	100.00	841	100.00	364	100.00

Stone tools recovered by excavation are not particularly distinctive. The thin slab metate appears more like those typical of the Anasazi than of the Cohonina, but this may be due to the sandstone material available rather than to cultural predilection. In the same way, both nether grinding bases and hand abrading stones differ from those described by McGregor (1951). The mano, handstones, and the multiface handstone are all of types duplicated in the Cohonina sites described by McGregor (1951), as are the hammerstones. Most flaked stone implements, from surface and excavation, are like those reported from other Cohonina sites. However, with the possible exception of one piece from the surface, none of the projectile points recovered are the characteristic "Cohonina point" figured by Colton (1946) or McGregor (1951). The two projectile points from the excavation are of the types termed "T" and "U" (Colton, 1946, Fig. 168), associated with the Cinder Park focus of the Sinagua. These also appear to be the same type as the third and fourth points in Figure 33 G, and some of those in Figure 34 (McGregor, 1951), where many are listed as coming from nonceramic sites. From this, it might be suggested that this stemmed projectile point is an early form, supplemented or replaced later by the long, triangular, slightly serrated "Cohonina point." Neither of the other projectile point types from the surface has been identified with the Cohonina, and the larger one appears to be an early Anasazi type. The drills also differ from those recovered by McGregor (1951) in his Cohonina sites. The remaining flaked stone artifacts fall generally within the typology previously established for Cohonina artifacts (Colton, 1946; McGregor, 1951). This is also true of the split metapodial awl, although this, like many of the less specialized flaked stone artifacts, has little, if any, diagnostic value in culture branch assignment. Whether or not the worked scapula constitutes a significant tool form can not be determined on the basis of a single specimen.

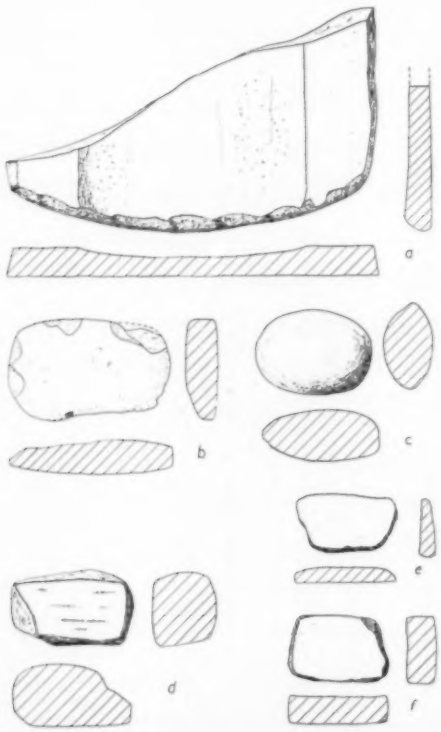

FIG. 116. Ground stone artifacts. Width of *a* 35.6 cm.

As previously stated, ceramically, GC 505 is Cohonina. This is evidenced by the predominance of San Francisco Mountain Gray Ware utility pottery. Based on intrusive sherds, the pottery association, as indicated in Table 18, belongs to Colton's Ceramic Group 3 (Colton, 1946, p. 20). Since no sherds from the excavation are later than this group, a general Pueblo I time level, probably between A.D. 700 and 900, is indicated. Thus, site GC 505 appears roughly contemporaneous with sites NA 2551, 2797, 2798, and 2799, all of which Colton places in the Coconino focus. Dendrodates for NA 2551 are A.D. 685+ and 888, and for NA 2798, A.D. 710+ to 927+, with a cluster at 740-760 (Smiley, 1951). The precise relationship to the sites reported by McGregor is not clear. Site NA 5166C is reported to be the earliest house excavated by McGregor, who gives dendrodates in the middle 700's. Yet, the preponderant intrusive pottery type is Black Mesa Black-on-white, a key type for Pueblo II and generally dated from A.D. 900 to 1100. In McGregor's site only one sherd each of Lino Black-on-gray and Kana-a Black-on-white were found to suggest an earlier component. Some confusion undoubtedly arises from the fact that, while evidently more than one structure was excavated, it is not clear whether the pottery from all structures was combined or only that from NA 5166C. Nevertheless, it seems clear that, ceramically, most of the occupation of site NA 5166C lies in the Naylier focus. Since McGregor does not discuss, nor even mention, the previously named Coconino focus of Colton (1946), it is not possible to determine whether these should be considered synonymous, areal variations, or consecutive foci. In any event, site GC 505 appears coeval in time and ceramic composition with sites of the Coconino focus (Colton, 1946) and somewhat earlier than Naylier focus (McGregor, 1951).

Of more than passing interest is the location of site GC 505. Colton, in his study of relationships of prehistoric groups of northern Arizona (Colton, 1939), indicated that the eastern part of the south rim of Grand Canyon was Kayenta Branch Anasazi territory. This areal assignment is repeated in Colton (1946) and in McGregor (1951). Little is known of the occupation of the Grand Canyon country during Basketmaker and

FIG. 117. Flaked stone and miscellaneous artifacts. Length of *i*. 10.3 cm.

Modified Basketmaker times, but the discovery of site GC 505 clearly indicates at least partial occupation by Cohonina peoples during Pueblo I times, farther north and east than had previously been suggested. Surface surveys of the area immediately adjacent to this site suggest that by Pueblo II times Kayenta peoples had moved into the region and, as indicated by Tusayan Ruin (Haury, 1931), continued to maintain themselves until the abandonment during Pueblo III. It would seem, therefore, that we must modify our concept of the cultural history of that part of the Grand Canyon region. Whether GC 505 indicates an occupation in force, or merely an outpost settlement, cannot be determined at present. In any event, there was a considerable trade relationship between this northeastern Cohonina group and the Kayenta Branch, as evidenced by the abundant Pueblo I trade pottery.

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JOE BEN and PAT WHEAT
University of Colorado Museum
Boulder, Colorado
August, 1953

EARTHENWARE AND STEATITE VESSELS FROM NORTHWESTERN WYOMING *

In the late summer of 1952, as the author was breaking camp at conclusion of the Smithsonian-Princeton field investigations at the Horner site, near Cody, Wyoming, a large earthenware vessel was brought to him for examination. According to its owner, Mr. Don Marquess, the vessel had recently been found "... under an overhanging rock near Goff Creek Lodge, which is located 43 miles from Cody, Wyoming, on the North Fork of the Shoshoni River, 10 miles from the East gate to Yellowstone National Park. The ledge of rock under which it was found is on the bank of Goff Creek, a mountain stream which runs through the camp and empties into the Shoshoni River. The bottom [of the pot] was protruding slightly from the surface of the ground. The rocks under which it was buried are of a flat nature of various sizes . . ." (Marquess to Wedel, letter of October 31, 1952).**

Mr. Marquess, owner and operator of the Goff Creek Lodge, permitted me to bring the piece back to Washington for repair and analysis, after which it was returned to him.

Earthenware pottery is relatively uncommon in this part of Wyoming, as of course throughout much of the state. Mr. Marquess graciously acceded to my request for permission to publish on his specimen, and a brief descriptive note was accordingly prepared. In searching the literature and the national collections for possibly related materials, and in discussing the problem with various colleagues, I was impressed by certain striking similarities between the Marquess vessel and a number of steatite jars collected long ago from various localities in western Wyoming and adjacent regions. This led to

* Published with permission of the Secretary of the Smithsonian Institution.

** My indebtedness to Mr. Marquess is obvious. In addition, for assistance of various kinds in gathering data, sketches, and photographs pertaining to steatite vessels, I am under obligation to the following individuals: J. A. Ford, American Museum of Natural History; J. L. Cotter, National Park Service; E. D. Freeland, Superintendent, and C. E. Jepson, Park Naturalist, Grand Teton National Park, Moose, Wyoming.

FIG. 118. Earthenware *a* and steatite vessels from northwestern Wyoming and adjacent localities.

wider inquiry, involving workers and collections in other museums and elsewhere, and finally resulted in the present paper. Though the data permit no final conclusions, they seem sufficiently suggestive to warrant presentation.

The Marquess vessel, when discovered, was in four pieces. As mended in the National Museum (Fig. 118, *a*), it is a moderately large and somewhat asymmetrical specimen, 26 cm. in height. It has a flat circular base, 10.5 cm. in diameter, whence the walls slope up and out to a maximum diameter (some three or four cm. below the rim) of 25.5 cm., thence curving in slightly to a simple unornamented rounding lip. Exterior rim diameter varies between 23.5 and 24.5 cm. The walls are of variable thickness, ranging between 10 and 15 mm.

The paste is fine and granular, and before application of a fixative was very soft and crumbly. The aplastic appears to be crushed granite; some of the inclusions are angular as though from freshly broken material, whereas others are distinctly rounded and suggest previously crumbled and weathered granite. Much of the exterior surface is badly scaled; what remains is heavily striated, rough, and uneven. The interior surface to within 8 or 10 cm. of the bottom is also heavily striated, the striae showing a decided tendency to spiral upward in counterclockwise direction. The rounding lip is uneven.

Color ranges from very dark gray in the upper and lower portions to a light buff-gray in the intermediate body zone. A carbonaceous coating adheres to the interior surface, particularly its lower half. No decoration is evident, unless the striated surface be so interpreted. I think the piece may be regarded, without much question, as a utilitarian cooking vessel.

Certain interesting details of construction are apparent, despite the extensive scaling of the surface and crumbling of parts of the vessel. Thus, the flat base, where not chipped at the edges, shows a definite flange. A crack runs around much of the base, apparently resulting from unequal shrinkage between the small disk of clay forming the core of the bottom and the subsequently added wall fabric. The wall line is rather uneven, and the base is not perpendicular to the vertical axis of the vessel; in consequence, the jar tilts perceptibly to one side when standing on its base.

The circumstances of discovery, as reported to me, give no clues to age of this vessel or to its tribal or cultural affiliations. There were apparently no associated artifacts or human skeletal remains. Accidental deposition, as by flood waters or other nonhuman agency, appears highly improbable. It seems likely that the vessel was cached beneath the rock ledge until such future time as its Indian owner planned to return to the same locality and again put it to use. The presence of granite aplastic in an area where there is no dearth of weathered and waterworn granite suitable for pottery tempering further suggests that the piece may have been made at no great distance from the locality of discovery, although burned or otherwise crumbled granite appears to have been widely used in pottery-making in the northern Plains. Finally, the size and relative fragility of the present piece also would seem to argue against its transportation over, or importation from, any considerable distance.

That pottery was used by a number of the native peoples who formerly resided in the Wyoming-Montana region is now certain (Mulloy, 1942; 1952). For much of the area, unfortunately, the materials at present available for study consist of samples too small to be really definitive; and in many instances their cultural context remains obscure (Wedel, 1947; 1951). From evidence at hand, however, it appears that in the eastern part of the region the ceramic remains tend to show relationships to better-known and more abundant materials farther east, particularly in Nebraska and the Dakotas. Thus, for example, in eastern Montana pottery has been found which is apparently related to the Mandan-Hidatsa tradition on the upper Missouri; in eastern and southeastern Wyoming, there are cord-roughened wares that look very much like Upper Republican pottery of western Kansas, western Nebraska, and northeastern Colorado. Farther west, the relationships are less clear, but would seem to be in part with other traditions than those just noted. It is not possible at the moment to identify with specific tribes the various pottery remains now coming to light, despite the fact that a number of the historic peoples of the region were evidently pottery-users to some extent.

Among the several pottery traditions apparently represented, there is at least one which includes flat-bottomed vessels. Of this, Mulloy (1952, p. 136 and *passim*) has the following to say:

> . . . The flat-bottomed pottery mentioned as associated with some possible Crow manifestations in the central Yellowstone may be Shoshoni. It is known from the central Yellowstone where it occurs separately in camp sites, and sometimes with Mandan-Hidatsa tradition ware to which it is foreign; from a camp site near Laramie, Wyoming, where it is associated with an Upper Republican-like ware; and from camp sites near the Great Salt Lake in Utah . . . A presumably typical vessel comes from a camp site near Billings (Fig. 56) . . .

The vessel figured by Mulloy from the Billings campsite closely resembles the Marquess piece in form and in basal features, and in all probability the two are manifestations of a single pottery complex. Mulloy notes other occurrences of this flat-bottomed ware, and these are of interest for their chronological implications. They include: a stone cairn "along a probable trail through Pryor Gap in western Big Horn County, Mont.," where olivella, dentalia, and glass beads were also found; and the upper one-foot level in and about Pictograph cave, near Billings, where iron, brass, and glass likewise occurred in association. The associations with contact materials suggest, of course, recency for the flat-bottomed pottery, though they leave still unanswered the question of the length of time during which it may have been used in the region.

Other flat-bottomed pottery vessels have been reported both archaeologically and ethnographically from Montana and adjacent regions. Thus, Schellbach's cave explorations along the Snake River in southwestern Idaho turned up simple bucket-shaped, basal-flanged clay pots in which the walls slope up and out to the rim (Schellbach, 1930); and de Laguna (1947, p. 247) briefly describes what seems to be the same sort of thing from the Snake River near Boise, Idaho. There is no indication of the possible antiquity or associations, if any, of these finds; but it is perhaps worth noting that the locality involved is in Shoshoni territory.

Ethnographic data indicate that the Kutenai (Schaeffer, 1952), Blackfoot (Ewers, 1945), Sarsi (Sapir, 1923), and Gros Ventres (Flannery, 1953, p. 65) manufactured flat-bottomed pottery; but the vessel shapes as reported, partly on the basis of inferential evidence, seem to have been more or less cylindrical. The Sarsi and Blackfoot wares appear also to have been much cruder than the Marquess, Billings, and Schellbach specimens, and may not have had a very long pottery-making tradition behind them. Whether and how these ethnographic materials were related to the archaeological specimens of the upper Yellowstone region is impossible to determine from the very meager and scattered evidence now available. To me, it does not seem very likely that the particular specimens under consideration in this paper can be attributed to any of the tribes enumerated above.

As for the Shoshoni, according to Teit (1930, p. 304) their bands at one time included in their range the Yellowstone National Park area; furthermore, he notes, "they are said to have extended east to the Big Horn Mountains or beyond," besides having inhabited much of central Montana and the Yellowstone valley eastward at least to Billings. Farther south, the Wind River Shoshoni dwelt in the sagebrush plains and valleys of Wyoming.

It is a matter of historical record that some of the Shoshoni, as recently as the beginning of the 19th century, were making pottery. Thus, Lewis and Clark (Thwaites, 1904-5, vol. 3, p. 19) wrote of the Lemhi River Shoshoni in 1805:

> . . . their culinary eutensils exclusive of the brass kettle before mentioned consist of pots in the form of a jar made either of earth, or of a soft white stone which becomes black and very hard by birning, and is found in the hills near the three forks of the Missouri between Madison's and Gallitin's rivers . . .

Neither Lewis and Clark nor, so far as I have been able to determine, any other firsthand observer, offer any further details concerning the characteristics of northern Shoshoni potterywares. According to Lowie (1924, p. 226), the Northern Shoshoni made pottery whereas the Wind River Shoshoni apparently did not.

The fact that Lewis and Clark saw clay pottery among the Northern Shoshoni, and the distribution of flat-bottomed earthenware over much of the area believed to have been inhabited at one time by Shoshonean peoples, seem suggestive. If this ware occurs in any quantity throughout Wind River Shoshoni territory south of the Yellowstone basin, it may mean that the Wind River groups also at one time shared the art but had lost it by the time ethnographic investigations got under way. In any case, it would appear that the evidence lends some support to Mulloy's tentative attribution of the flat-bottomed ware to the Shoshoni. I am tempted to go a step further and suggest that the bucket-shaped vessels reported from the Snake River in southwestern Idaho and the somewhat differently shaped, but also flat-bottomed, pieces from Billings and Goff Creek may be band or tribal variants of a single widespread flat-bottomed ware with Shoshonean affiliations.

In the absence of additional controlled archaeological and ethnographic data, there seems little that can be said regarding the wider relationships of this flat-bottomed pottery. Other wares, or traditions, in which flat-bottomed vessels occur are known, of course, both east and west of the Continental Divide. On the west and southwest, the nearest recorded occurrence would seem to be the Yokuts-Western Mono pottery of the southern San Joaquin valley, California (Gayton, 1929), where some of the vessel forms show an interesting resemblance to Schellbach's Snake River pottery and others call to mind the Blackfoot, Sarsi, and Gros Ventre shapes.

Among eastern wares, we may note the protohistoric Paint Creek pottery from central Kansas, assigned with some assurance to a mid-sixteenth century Wichita manifestation (Wedel, 1942); and the presumably much earlier Baumer and Crab Orchard wares of Illinois (Maxwell, 1952, Fig. 96, no. 23, and Fig. 98, nos. 1, 2, 4). Here, different and earlier time levels are involved, and I see no good reason at the moment for postulating a direct connection between these wares and the flat-bottomed pottery from the Yellowstone basin.

Schaeffer (1952, p. 8) is apparently convinced that the Blackfoot, Kutenai, and Sarsi wares had their source in northwestern Plains ceramics; and presumably he would include here the Gros Ventre pottery as well. He may be right; but to me the steps by which these tribally identified wares developed from the demonstrably or probably earlier ceramics of the Montana-Wyoming region and eastward are by no means clear. I am not convinced, in other words, that a western or ultimate southwestern source can be ruled out as yet. Less likely, but perhaps still to be considered, is the possibility of some northerly source. It seems to me that we still know too little about the archaeology of much of this vast territory to be able to demonstrate convincingly just what did happen.

So far as I am aware, the resemblances and possible relationships between the flat-bottomed earthenware pottery and the steatite vessels of the Wyoming region, have not been noted heretofore in the literature. More than 40 years ago, in a paper seemingly all too seldom read by later students, Harlan Smith (1910) noted the use of steatite containers in apparent preference to clay pottery throughout much of the state. He pointed out that the products of the local steatite industry differed

considerably from those previously reported on the Atlantic and Pacific coasts of the United States. Unfortunately, we still know very little about aboriginal steatite-working in Wyoming beyond the fact that, as Smith (1910, p. 517)stated, the vessels are usually

> . . . unlike the trough-shaped dishes of the east and the globular ollas of California, some being of the form of an egg with the tip of the larger end removed, others of a steep truncated pyramid with rounded corners and bulging sides, while others are somewhat of the latter form, but longer than they are wide. . . .

Smith was not the first to call attention to these Wyoming steatite products. Several specimens from the Yellowstone National Park were described and figured by Superintendent P. W. Norris (1881, pp. 32-4, Figs. 3-6) nearly three decades earlier; some of these are preserved in the national collections. Other pieces, very briefly described but in general apparently conforming to Smith's thumbnail description, have since been reported by Renaud (1932, p. 56) from several localities in southeastern Wyoming. I suspect that a careful survey of museum and private collections would reveal additional examples of these stone vessels; but so far as I have been able to determine, no one has yet attempted to bring together and evaluate the scattered and meager information that still awaits study.

While this is not the place to attempt such a review, certain flat-bottomed steatite vessels are of direct interest in the present connection. Three of these are illustrated in Figure 118, *b-d*. These and others have been found in various localities in and around Yellowstone National Park, that is, in the general region where the Marquess earthenware pot was collected, and also in a number of spots more remote from the Park. How typical they are I cannot say; but since substantially similar pieces seem to characterize Wyoming collections in the National Museum and in the American Museum of Natural History, I assume these are probably fairly representative.

The steatite pots I have examined personally, or for which I have sketches, photographs, and/or descriptive data seem to be usually of small to medium size, that is, under 25 cm. in maximum height and somewhat less in greatest diameter. They range downward in these dimensions to perhaps 10 or 12 cm. In vertical profile, they are variable but tend to be more or less truncated ovoid — like an egg with both ends cut off and the smaller used as the base. There is also a strong tendency toward lateral flattening, so that viewed from above the pots are elliptical, and often asymmetrical, in outline. Rims are generally irregular, and the walls of very uneven thickness and smoothness. The flat bases, nearly always more or less elliptical in outline, are usually clearly set off from the walls and may have a pronounced bordering flange. This flat base, often flanged, and the general vertical profile of the vessel readily distinguish these pieces from the better known steatite wares of the Atlantic and Pacific coastal regions, as Smith correctly noted; and to me they are strikingly suggestive of the same features in the Marquess earthenware pot (see Fig. 118).*

Ethnohistorical data indicate that steatite-working, like pottery making, was probably carried on by Shoshonean groups into the 19th century. Lewis and Clark, as we have already noted, credited the northern Shoshoni with manufacture of stone vessels, as well as earthenware; and it seems very probable that the "white soft stone" they mention was steatite. There are additional references to stone vessels among the Indians of the region. Thus, Larocque (1910, p. 38) stated in August 1805, one day earlier than the Lewis and Clark record, that:

> I traded eight beavers with the Snake Indians in whose possession I saw a Kettle or pot hewn out of solid stone, it was about 1½ inch thick & contained about 6 or 8 quarts; it had been made with no other instrament [sic] but a piece of Iron . . .

And, in 1848, Nathaniel Wyeth (Schoolcraft, 1851, Pt. 1, p. 211) reported seeing among the Indians of the Snake River, ". . . a stone pot, holding about two quarts, made of pure lava, and shaped much like the black-lead pot used in melting metals . . ." The sketch accompanying this description shows a flat-bottomed vessel with walls widening out and up, shaped strikingly like the flat-bottomed earthenware vessel figured by Mulloy (1952, Fig. 56) from the Billings campsite. How closely this drawing resembles the specimen seen by Wyeth I have no way of knowing; it may be a rather conventional representation by an eastern draftsman of a piece described to him but not actually before him as he made the drawing. Whether the observations of Larocque and Wyeth pertain to steatite or to some other stone, I am unable to say positively. It should be noted, however, that Lowie's Wind River Shoshoni informants specifically "mentioned man-made soapstone pots" (Lowie, 1924, p. 225).

From such scanty controlled archaeological evidence as is now at hand, it seems fairly clear that pottery-making is a comparatively late development in the upper Yellowstone and Missouri headwaters region; but what

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* The flat-bottomed steatite vessels on which the foregoing remarks are based include the following specimens:

1) USNM 176088 (fig. 1, b); ht. 19.7 cm; Mammoth Hot Springs, Yellowstone National Park, collected by Chas. Hunter, 1897.

2) AMNH 20.2/3826 (fig. 1, c); ht. 23 cm; Devils Slide Gulch, between Gardiner and Corwin Springs, Mont. Photo from American Museum of Natural History.

3) No number (fig. 1, d); ht. 19 cm; collected by Wm. Beard, Tetonia, Idaho; now in Jenny Lake Museum, Grand Teton National Park. Photo courtesy Carl E. Jepson.

4) USNM 282340; fragmentary; collected by N. H. Darton, U.S. Geological Survey, in the Big Horn Mtns., 1½ miles east of Lake Solitude and three miles southwest of summit of Cloud Peak, at elevation of 10,500 feet.

5) AMNH 20.0/3587; collected by Geo. Olson "¼ mile west of the Pacific [Pacific Creek?]," Fremont County, Wyo.

6) AMNH 20.2/3884; Torrey Creek Canyon, Fremont and Carbon counties, Wyo.

7) AMNH M869; near Evanston, Uinta County, Wyo. Douglas Coll.

this means in terms of actual chronology, I am unable to suggest at this time. The rather striking similarity between flat-bottomed earthenware pots with basal flange and the steatite vessels described above leads me to suspect some sort of direct influence of one on the other. Which of the two — steatite or earthenware — is the earlier I cannot say; the very limited and inconclusive data from Birdshead cave, in the Wind River Basin, suggest that clay vessels may be about as early in that locality as steatite (Bliss, 1950, pp. 193-5). Whether this inference is valid and, if so, its applicability or non-applicability to the region in general, is for the future to disclose. What is urgently needed, of course, is a great deal more detailed information on the exact nature, antiquity, distribution, associations, and wider relationships of the steatite industry in the Wyoming area; and in view of the generally meager nature of findings at most sites here, this sort of information may be a long time coming.

It is unnecessary, of course, to stress the inconclusive nature of much of the foregoing material. The evidence, meager and tantalizing, is at best suggestive rather than definitive. On the broader problems of origins and relationships I have no opinions to add to the speculations scattered here and there throughout the above pages. With reference to the particular specimens which led to this paper, my present views may be briefly summarized as follows:

1) The Marquess earthen pot probably belongs in a ceramic tradition characterized in part by flat-bottomed basal-flanged vessels whose distribution includes the central and upper Yellowstone drainage and an undetermined area to the south and southwest, across the Continental Divide into the Great Basin as far south as Wendover, Utah (Jennings, personal communication);

2) The flat-bottomed basal-flanged steatite vessels from the upper Yellowstone drainage, with a still indeterminate distribution southward, may reflect the same form concepts carried over into, if not transferred from, another medium;

3) Since Shoshonean peoples are believed to have been the late prehistoric and protohistoric occupants of the upper Yellowstone-Missouri headwaters-Snake River region, and since early historic Shoshonean peoples here are known to have used both earthen and steatite vessels, there is presumptive evidence that they were the makers of the pieces in question.

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NEW EVIDENCE ON THE ORIGIN AND ANCESTRY OF MAIZE

New evidence concerning the origin of maize — a question which has puzzled botanists for more than a century — has made it possible to reach several rather definite conclusions:

(1) Maize is undoubtedly an American plant.

(2) Maize undoubtedly had at least one center of origin in Middle America.

(3) The ancestor of maize is maize.

(4) The ancestor of maize is a form of pod corn, but perhaps not the extreme type of pod corn known today. The ancestor was certainly a popcorn.

(5) Sometime in its history maize hybridized with Tripsacum or teosinte or both to produce radically new types which comprise the majority of modern maize varieties of North America.

The evidence on which these rather sweeping conclusions rest comes from three fields — botany, archaeology, and genetics.

Substantially conclusive evidence of the American origin of maize was obtained from fossil pollen grains discovered at a depth of more than 200 feet below Mexico City. These fossil grains were found in drill cores studied by Paul Sears of Yale University and Kathryn Clisby of Oberlin College. First thought to be pollen grains of teosinte they have now been identified by Elso Barghoorn of Harvard University and Margaret Wolfe of Radcliffe College as fossil pollen grains of maize. In making this identification Barghoorn and Wolfe compared the fossil grains with modern pollen grains of maize and its two relatives, teosinte and Tripsacum, not only in size but also in the ratio of the diameter of the pore to the diameter of the entire pollen grain. In this characteristic the fossil pollen is quite similar to modern maize and differs from both teosinte and Tripsacum. On the basis of currently accepted glacial chronology the fossil maize pollen is at least 60,000 years old. It thus antedates by many thousands of years the earliest evidence of agriculture or of man himself in this hemisphere. It seems probable that the fossil pollen is that of wild maize which once grew in the Valley of Mexico.

New archaeological evidence bearing upon the problem comes from caves in Mexico, New Mexico and Arizona.

In La Perra cave in the state of Tamaulipas, Mexico, Richard MacNeish of the National Museum of Canada turned up small cobs of a primitive maize dated by Libby's radiocarbon determinations of associated vegetal remains at 4445 ± 180 years. My colleague, Galinat, and I have studied the botanical characteristics of these early La Perra cobs and have concluded that they represent the prototype of a small-eared race of popcorn, Nal-tel, which is well illustrated on Mexican funerary urns and which is still grown by the Indians in Yucatan and Campeche. The La Perra maize appears to be an agricultural type in the early stages of domestication.

Even more primitive cobs have been identified in archaeological material dug up in 1950 by Herbert Dick, then of the University of Colorado Museum. This maize comes from Bat Cave in New Mexico and is dated at 5605 ± 290 years by Libby's radiocarbon estimates of associated charcoal. Dick, in an earlier expedition in 1948, had found in Bat Cave the oldest and most primitive corn then known. In the more recent expedition he turned up still smaller and more ancient specimens.

The small cobs of the Bat Cave maize are scarcely larger than a one-cent piece. They are extraordinarily well preserved and it is possible to study their botanical characteristics in detail. The most primitive cobs are characterized by a very slender rachis, glabrous cupules, long rachillae and tiny kernels, approximately fifty in number, which are almost completely enclosed in long soft glumes. The long rachillae and long, soft glumes are characteristics of pod corn. Remains of several kernels were found along with pieces of tassel, husks and pollen grains. From the combined vegetal remains it has been possible to make a tentative reconstruction of the ancient maize plant. Apparently this primitive maize had a short slender stalk not more than a few feet in height bearing a few kernels at the base of the tassel and a miniature ear immediately below the tassel. The ears were enclosed in relatively long husks which spread open at maturity. A plant of this kind probably could have existed in nature, and, although this earliest Bat Cave maize may have been cultivated, it was not far removed in its botanical characteristics from wild maize.

Although both the Bat Cave maize and the La Perra maize in Mexico are primitive, they differ in a number of botanical characteristics to the extent that we regard them as two types which were domesticated separately from geographically distinct races: one adapted to the lowlands and the other to the highlands. We suspect that there may have been additional races of wild maize in Central America and perhaps in South America as well. The recent discovery of wild beans in both Middle and South America lends some support to this suggestion.

The primitive Bat Cave maize proves beyond a reasonable doubt that the ancestor of maize was maize and

not, as some nineteenth century botanists have supposed, the related grass, teosinte.

Yet teosinte (or another related grass, Tripsacum) has clearly played an important part in the evolution of maize. Prehistoric cobs from other caves show evidence of the contamination of domesticated maize by teosinte. This evidence comes from Cebollita Cave in New Mexico, from two caves in Arizona, and a cave in Chihuahua, Mexico. These were explored respectively by Reynold Ruppe of the Peabody Museum of Harvard University, Lloyd M. Pierson of the National Park Service, and Robert H. Lister of the University of Colorado Museum. In the material from each of these caves there are specimens of cobs which show strong evidence of contamination by teosinte. Furthermore, it is possible to match some of the archaeological specimens almost exactly with synthetic types produced by actually hybridizing maize and teosinte. The hybridization of maize and teosinte may have been a comparatively recent event in the history of maize under domestication. In the material from Cebollita Cave the early maize is all "pure" maize while the more recent material shows strong evidence of contamination.

Although there are many questions yet to be answered, the main features of corn's origin and evolution are now reasonably clear. The American Indians apparently domesticated maize wherever they found it. Domesticated varieties originating from distinct geographical races soon hybridized to create new and more productive types. Still later corn crossed with teosinte. To new races resulting from this cross teosinte contributed not only resistance to drought and diseases and the structural strength needed for the development of large plants and ears, but also mutability.

All of these factors combined to speed the evolution of maize to a point beyond that of perhaps any other cultivated plant. In 6000 years, or less, a small wild grass bearing tiny ears no larger than a modern strawberry has evolved into one of the world's most productive cereals. The evolution of maize has been truly explosive. Most of the factors involved in this extremely rapid evolution have been largely accidental. There is little evidence that man practiced artificial selection in maize in the early stages of domestication, or if he did, no evidence that he succeeded. His role was primarily one of creating opportunities for hybridization between races of maize and between maize and its wild relatives. But when man finally did begin to practice selection, he had a rich diversity at his disposal from which it was possible to choose a combination of characteristics that have made maize one of the most efficient of all cereals as a producer of foodstuffs.

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BOOK REVIEWS

Copan Ceramics, A Study of Southeastern Maya Pottery. JOHN M. LONGYEAR, III. Carnegie Institution of Washington, Publication 597, Washington, D.C., 1952. 114 pp., 118 figs, 3 maps, 14 tables. $5.25 paper, $6.25 cloth bound.

This excellent report is an example of the growing tendency among archaeologists to present a well-rounded picture for the general reader and reserve specialized material for a section that can be skipped by all but the specialists concerned. John Longyear's Introduction gives a description of the site, based on Morley's *Inscriptions at Copan* (1920), a history of the site since 1920, a statement of problems in the southeastern Maya area and the part to be played in their ultimate solution by ceramic studies at Copan.

Part I describes the stratigraphic cuts that provided chronologically significant material, and the pottery sequence derived from it. Vessels from graves, tombs, and sub-stela caches are considered next, integrating finds from earlier excavations with those of the Carnegie Institution. A chapter on special wares and forms discusses Usulutan painting technique, cylindrical tripods (slab-footed), and various types of polychrome, carved, and incised vessels that seem important. *Conclusions* consists of a reconstruction of Copan prehistory, its relative and absolute dating, and further consideration of southeastern Maya problems as a whole.

Part II considers what scanty skeletal data could be salvaged, together with detailed descriptions of pottery by wares, and of artifacts of stone, shell, bone and metal, this last category consisting only of two gold figurine legs.

Copan lies in a pleasant, fertile, river valley in the precipitous mountain country of western Honduras, about 17 kms. east of the Guatemala border. Longyear's work there from 1938 to 1946, correlated with study of other available Copan pottery, notably the results of Gordon's digging for the Peabody Museum of Harvard from 1891 to 1897, produced a sequence of four main periods, Archaic, Early Classic, Full Classic and Post-Classic.

Copan's Archaic was a home product. It is equivalent in general to Miraflores at Kaminaljuyu, but belongs to the upper level of the Comayagua Archaic complex that stretched from the Ulua Valley south into eastern El Salvador. At Copan this is confined to monochrome (Coarse) and bichrome (Burnished) wares, and is marked by tetrapods and Usulutan technique. This simple linear decoration in groups of wavy lines that may or may not be due to resist painting is frequent in the southeastern Maya area and is known from the Guatemala Highlands as a diagnostic of late Archaic. Copan, like Tazumal in El Salvador, shows that it persists into the Full Classic period. The work at Copan also defines several local areas in the Archaic period.

The Early Classic, resembling Tzakol in the Peten and Esperanza at Kaminaljuyu, shows a new and distinctive shape in Burnished Ware, a scalloped basal-molding bowl on four hollow mammiform rattle feet. The period is chiefly marked by two wares that are considered imports — basal-flanged polychrome bowls, and black or white cylindrical vases with three slab feet, the latter shape, usually with lid, being a diagnostic for the second half of the period. Full Classic, roughly equivalent to Tepeu in the Peten, though not resembling it, is marked by a distinctive local polychrome called Copador, unique in its specular hematite red paint and stylized designs. The cylinder jar, polychrome and carved, appears at this time. Post-Classic consists of a few plumbate and related vessels found in post-occupation deposits in the Acropolis and not represented in stratigraphic cuts.

The Ulua-Yojoa area in central Honduras, studied by a Smithsonian Institution-Harvard University expedition in 1936, and Tazumal in western El Salvador, dug by Boggs in the '40s, are the only other places on the Maya southeastern frontier known at all ceramically. With Copan they form the points of a triangle that covers the region fairly well. In both Honduras and Salvador there are two main pottery complexes: — monochrome-bichrome, equivalent to Maya Archaic, and polychrome, roughly equivalent to Maya Classic. Work at Copan has merely added a problem to the Honduras picture, by implying a late cross-dating for Ulua-Yojoa polychrome. In El Salvador it shows Maya influence, since Copador polychrome is common at Tazumal and reported as far east as San Salvador.

Longyear translates the Copan pottery sequence into human terms by postulating the arrival in the relatively inaccessible Copan Valley of a simple, corn-growing Archaic population only about 100 or 200 years before the start of Early Classic in 9.0.0.0.0 (435 A.D.). There is some reason to think that they may have been rather large robust people compared to the band of classic Maya, devoted to the hierarchic cult flourishing farther north, who arrived and took over to form the Early Classic period. The dated stone stelae start (9.1.10.0.0?, Stela 20, 465 A.D.), the Acropolis takes form, and society becomes stabilized and more complex. In Full Classic times, starting probably between 9.8.0.0.0 and 9.9.0.0.0 (ca. 600 A.D.), ceremonial pottery changed in style, burials were flexed instead of extended, and building, sculpture, and civic development were at their height. "The Maya hierarchic cult left Copan as it came, suddenly and unobtrusively . . . priests and craftsmen . . . and most of the common people also moved away from the built-up areas, probably to the refuge of the surrounding hills." The last stone monument is dated 9.18.10.0.0 (800 A.D.), and Longyear feels that the exodus must have taken place before 9.19.0.0.0 (810 A.D.) or the count of the katuns would have continued to be marked here as it was in other great Maya cities.

The Post-Classic, due probably to brief trips back to the deserted Acropolis to sacrifice to some still-remembered god or to bury a chief in the ruins, shows out-

side contact still in trade pieces from north and south. These are so different from the Full Classic forms that they are assigned a date of between 10.8.0.0.0 and 10.19.0.0.0, roughly 1000-1200 A.D. The people settled back in the foothills into their Archaic way of life and kept it undisturbed until the present village of Copan was built about 1850 A.D.

Personally and as an anthropologist I cannot praise too highly the clarity and simplicity of Longyear's style and terminology. It is a joy to read a report that reduces rather than adds to the present welter of ponderous labels for pots and periods. To make available not only the stratigraphic work of the Carnegie but the excellent Copan collection from the Peabody in such a competent and readable monograph is a real contribution. The historical reconstruction in sociological clothing is plausible, provocative, and does not build too heavily on slim foundations. The discussion of dating includes a summary of the current status of Christian-Maya calendar correlation, Longyear feeling that Acosta's work at Tula re-establishes the 11.16.0.0.0 (=1539 A.D.) correlation, permitting a much better balanced pottery sequence than the recently popular 11.3.0.0.0 correlation.

There are arguments for and against the form of presentation of *Copan Ceramics* which I shall not go into here. Segregating scientifically vital but dull detail should be the ideal way to write any archaeological report. Actually there are inherent problems of restatement and diffusion of related material that are hard to deal with. The plates and tables are excellent, but as one interested in the pottery I felt two lacks. All information as to sherd quantities is relative, except for the total. We know that polychrome sherds in Early Classic were approximately 2 per cent of the whole, but we have no idea whether there were 10 or 100 of them. Such figures may be gotten from the librarian of the Peabody Museum, but it would have been better to have them in the text, to lend weight to any discussion of ware history or diffusion.

The second lack is that of a color chart reference. A striking feature of Copador polychrome is its maroon or blue-red coloring in contrast to the orange-red prevalent in other Maya polychrome. No one who did not already know the ware would realize this from the text unless the term "red" in *Copan Ceramics* is reserved for maroon. Since any five people will give at least three different names to the same color some standard of reference would have clarified this particular point and any others like it.

In discussing distribution of Copan wares and possible origin of imports, Longyear leaves out of consideration part of the Maya area that is, admittedly, almost as far as possible from the southeastern frontier. This is the Usumacinta drainage and the Chixoy area draining into it. Pottery already published from Piedras Negras includes Polychrome E, consisting of a Copador-type bowl, a related bowl with maroon border and mat design, and several sherds either imported or copied from Copan. Piedras Negras incidentally offers a clue to what became of all the jade from collars and necklaces, a point raised by Longyear. A string of pottery beads, found with pottery copies of bivalve shells in a Piedras Negras burial, suggests that even in Maya times imitation jewelry was a flourishing business.

This area would not support Longyear's belief that the basal-flanged bowl and the cylindrical tripod were uniform in style throughout the Maya area during their use as ritual vessels in the Early Classic period, and were followed in Full Classic times by a variety of local ceremonial wares in different cities (p. 70). This may be so at Copan where there is a marked change from probably imported to definitely local ceremonial wares. But not only do the Usumacinta and Chixoy areas point up the variety of style in basal-flanged bowls and slab-footed tripods; the Chixoy drainage shows, in the Alta Verapaz, a perfectly clear and logical development from these early basal-flanged polychrome bowls into the polychrome, carved, and incised jars of the next period, Chixoy II, roughly comparable to Copan Full Classic. This development and the fact that a good deal of the representational decoration on western Alta Verapaz early bowls and later jars is the most realistic, detailed, and finely executed yet found may very well mean that the Chixoy area is, by Longyear's own criterion (p. 55), the center from which these styles spread to the rest of the Maya world. There would seem little doubt that the finely carved brown ware cylinder jar (Fig. 117, *a*), so different in style from Copan human and glyphic decoration, is either an import from the Chixoy area, or, if of local ware, made in Copan by a Chixoy craftsman. The cylinder jar shape, characteristic of Chixoy II, appears also in Copan Full Classic, in other carved jars related in style to this one, and in the local Copador ware as well. It would seem that fine vessels took certain shapes in certain wares at certain periods but always showed some local variation in style.

The black-and-white negative-painted tripod vases in the second half of Copan's Early Classic period closely resemble in shape, technique, and distinctive elements of design such as small reserved circles (p. 57), jars without feet from Nebaj and Kixpek belonging to the first part (Chamá 3) of Chixoy Period II. The four animal-head vessel feet found in a Post-Classic deposit (Fig. 102, *i*) are identical with those used late in the Chixoy area and elsewhere in the Guatemala Highlands as tripod supports for shallow bowls. One wonders whether these are not cherished survivals from two bowls rather than a late and unexpected appearance of tetrapods as stated.

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Report of the Investigation of the Scalp Creek Site 39GR1 and the Ellis Creek Site 39GR2, Gregory County, South Dakota. WESLEY R. HURT, JR. South Dakota Archaeological Commission, Circular No. 4, Pierre, 1952.

This report is Hurt's second on his share of the archaeological salvage program in the Missouri Valley. It and his paper on the Swanson site are the only final site reports to appear to date from the extensive work in the area, and he deserves every credit for the promptness with which he has made his material available.

The report deals with the excavation of two sites situated about three-quarters of a mile apart on the west bank of the Missouri River, just north of the Nebraska-South Dakota boundary. Only one component was present at the Ellis Creek site, while two, and a possible third, were isolated at Scalp Creek. The upper level at the Scalp Creek site has been assigned to the La Roche focus which appears to be one manifestation of the late village complex of the Northern Plains. The houses of the La Roche component at Scalp Creek were circular with central fireplaces and usually had four primary roof-support posts set in a square around the fireplace. Entrance passages were generally oriented to the southeast. The village was defended by an encircling stockade and a ditch dug across the neck of the point on which it was located. Associated pottery included a variety of types with simple-stamped bodies and incised decoration. The pottery is distinguished by very fine temper and unusually thin walls. Other La Roche artifacts include types common in the majority of the late prehistoric villages of the Northern Plains.

The earlier component at the Scalp Creek site and the material from the Ellis Creek site have been assigned to the Loseke Creek focus, a variant of the Plains Woodland heretofore only known from farther south in Nebraska and possibly western Iowa. The two Loseke Creek villages reported here appear to have been scattered collections of some undetermined type of semi-permanent dwelling. Fireplaces were represented only by burned areas, but a few small basin-shaped pits seem to derive from the Woodland occupation. Subsistence was evidently based primarily on hunting and gathering, particularly in the wooded stream bottoms. However, the presence of a few scapula hoe fragments and other digging tools may indicate some horticulture. The associated artifact complex is a relatively simple one. Pottery included vessels with rounded rather than conoidal bases and with cord-roughened exteriors. There was a considerable range in projectile point form and size, but a fair proportion were quite small. A number of chipped stone knives and other tools which could have been used for skin dressing were found, but bone hide-working tools were quite rare.

The material presented in the report makes a very welcome addition to the rather scanty literature on Plains archaeology. The data on the upper horizon expands and consolidates the available information on the La Roche focus which had previously been known from only one excavated site. The Ellis Creek material, together with that from the lower level at Scalp Creek, serve to demonstrate the presence of the Loseke Creek focus in the Middle Missouri section of the Plains, and provide welcome information on the characteristics of this northern extension of the complex.

There is, however, one point of interpretation which calls for comment. The report indicates that Hurt feels it is possible to distinguish an upper Woodland component at the Scalp Creek site. He has called it the Randall component, and considers it to represent an as yet unrecognized focus characterized by pottery which "is related to varieties found in the Upper Republican Aspect, Nebraska Focus, and in the Swanson component of South Dakota" (p. 32). The evidence for distinguishing such a component seems to be decidedly weak. According to the author: "No visible soil changes between the midden of the Ellis and Scalp components and the Randall component were present in the Scalp Creek site" (p. 32). No differences in the nonpottery artifacts from the two Woodland levels are noted, and the majority of the Woodland pottery types occur in both horizons. Apparently the only criterion for distinguishing the Randall component was the presence of two pottery types, Randall Incised and Ellis Plain, in the middle levels of the midden. It appears that a total of 25 Ellis Plain and 14 Randall Incised sherds were found in the entire site (pp. 68, 69). Scaling off the graph on p. 65, it would seem that approximately 15 of these 39 diagnostic sherds were found in stratigraphic context.

So far as the present report is concerned, the occurrence or absence of a third component at the Scalp Creek site might not be a matter of particular moment. However, when a subsequent report by Hurt tentatively derives the St. Helena focus of the Upper Republican aspect from a component established on the basis of 39 potsherds, it becomes a matter of somewhat more concern.

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The Chance Horizon, an Early Stage of Mohawk-Iroquois Cultural Development. WILLIAM A. RITCHIE. Circular 29, New York State Museum, June, 1952. 53 pp. 4 figures, 9 plates.

Over a period of many years the question of northern Iroquois origins has received sporadic consideration. MacNeish (Iroquois Pottery Types, *National Museum of Canada*, Bulletin 124, 1952), after a survey of the archaeological materials existing in private and institutional collections in the New York area, postulated that the northern Iroquois were indigenous to New York and vicinity. He pointed out that some of the Owasco pottery types may have developed into Iroquoian pottery types. He suggested that the Owasco and other late Woodland cultures in Ontario and New York developed into the northern Iroquois.

Ritchie's report on the Chance Horizon is a summary of his efforts to test the adequacy of this hypothesis. He considered only the Mohawk area and bases his conclusions chiefly upon information obtained during the 1949 and 1950 field seasons. Five small sites in eastern New York constitute this horizon. They are located in the counties of Schoharie, Montgomery, Ulster and Otsego. These sites do not represent a transition from the Owasco to the Iroquois, but are the earliest evidence of the Mohawk in the area. This is based upon the inference that sites showing similarities in pottery and other cultural traits to known Mohawk sites can also be considered Mohawk.

The Chance Horizon sites are located on high, well-drained ground and consist of shallow refuse deposits. All lie to the south of the Mohawk River. These small sites, Ritchie believes, may have had typical Iroquoian longhouses, an assumption based on the discovery of a line of post molds 28.6 feet long on one of the five sites.

The most important section in this publication is headed "Interpretations and Conclusions." This covers 15 of the 33 pages of text. It is preceded by short statements concerning the location of each site, the general nature of the artifacts recovered from each, and the names of those individuals whose cooperation was enlisted in this study. For a detailed listing of the artifacts from four of the sites, one is referred to a five page trait table in which are recorded the frequency of occurrence for each trait at these sites (Chance, Deowongo Island, Kingston and Oak Hill). The fifth — the Second Woods site — is discussed primarily because five pottery pipes were recovered there which are of interest to the thesis.

In his "Interpretations and Conclusions," Ritchie briefly considers the nonceramic inventory of this horizon. Since the lithic traits are diagnostic for neither the pre-Iroquoian or Iroquoian culture, his attention is directed to the pottery of the horizon. The reader is not burdened with formal descriptions of the pottery types. He is referred to Ritchie and MacNeish (The Pre-Iroquoian Pottery of New York State, *American Antiquity*, Vol. 15, pp. 97-124. 1949) and to MacNeish (1952). These, Ritchie points out, contain descriptions of all but one of the types to be considered. The single exception is Deowongo Incised which he establishes in this paper. We are told that "The addition of faint basal collar notches to Chance Incised, a departure which instituted a progressive trend traceable throughout subsequent Mohawk history in the types presently to be enumerated, constitutes the writer's criterion for the differentiation of the Deowongo Incised form" (p. 23).

In discussing the pottery, the surface treatment of the body sherds is considered, then the characteristics of the paste, the neck and shoulder decoration, and finally the "rim morphology, design motif and technic of ornamentation" (p. 17). The roughly smoothed surface on the majority of the body sherds is typically Iroquoian. The paste is Iroquoian in character. The neck and shoulder decoration indicates a mixture of certain Owasco and Iroquoian types. The decoration and form of some rim sherds indicate resemblances between the Owasco and Chance cultures. Early Oneida-Onondaga and Chance resemblances are found in other rim sherds. In discussing these similarities, views concerning the sequences of several pottery types and the character of some pottery traditions are expressed. In some of these sequences, there is disagreement with those proposed by MacNeish (1952).

Ritchie concludes "the currently available data, in the judgment of the writer, supports the concept of a multiple origin for Mohawk culture, which in this light appears as a syncretism resulting from the eclectic contributions of at least two principal donors, one situated to the south, one to the north of the Mohawk heartland" (p. 25). The southern donor is found in southern New York (late Owasco); the northern one in southeastern Ontario (proto-Onondaga-Oneida).

This study does not disprove the hypothesis which was being tested. It does indicate that considerable work remains to be done in the northeastern archaeological area. Several questions with respect to Iroquois origins remain to be answered. Some theoretical concepts must be contemplated. For example: why are early Iroquois sites small when late Owasco sites are large in area? How would a transition site appear to the archaeologist? Would abrupt changes in certain artifact types be expected if culture contacts were of a peaceful nature? These and other questions should be considered by those concerned with cultural continuity in prehistory.

A detailed analysis such as this may not appeal to a large audience. The several paragraphs dealing with pottery type sequences can be appreciated only by those already familiar with the types, or by those who have ready access to the two publications noted above. Unfortunately, in the two plates illustrating sherds, the specimens are reduced in size making a careful study of their decoration and form somewhat difficult.

Despite the small number of pages constituting this report, one will find it doesn't lack in content. It represents considerable study and thought. Not only is the archaeological knowledge of the region examined, but some of the linguistic and historic information is also considered. This publication will be of definite value to those interested in the Iroquois.

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Space and Time Perspective in Northern St. Johns Archeology, Florida. JOHN M. GOGGIN. Yale University Publications in Anthropology, No. 47. Yale University Press, New Haven, 1952. 147 pp., 12 plates, 8 text figures, 1 map. $2.00.

With the publication of this monograph, we now have at least preliminary reports on the archaeology of virtually all of Florida. Willey's *Archeology of the Florida Gulf Coast*, along with various monographs by Goggin, Rouse, and Ferguson, make available very usable summaries for all of the archaeological areas of the state. This report summarizes previous work, surveys of museum collections, and the results of the University of Florida's excavations in that section.

It opens with a description of the area to be discussed, which extends from the Atlantic coast inland to approximately the Alachua-Putnam County line and from the outlet of Lake Harney north to include parts of the Okefinokee Swamp. This region is divided into four subareas which seem to be mainly physiographic provinces. The landscape is described as it exists today and the recent ecological changes pointed out. The brief discussion of early visits by Europeans to the area is treated in terms of Indians, forts, and missions. The material on the tribes inhabiting the region is necessarily brief but seems to include all worthwhile references. Under "Archeological Research" there is a summary of work accomplished from Spanish times to the present. The temporal chart is the latest revision of Goggin's ideas on the dating of Florida archaeological periods.

These periods are: Mt. Taylor, Orange, St. Johns, St. Augustine, and Seminole. Indications point to a date of about 1850 B.C. for the Orange period. The St. Johns period lasted until soon after the arrival of French and Spanish in the late sixteenth century. The St. Augustine and Seminole periods are within the historic era. Each period is briefly characterized by its typical artifacts, type of site, burials, etc. The sites showing the remains of each period are listed by site designations and all are shown on the accompanying map.

The Mt. Taylor period, the oldest, is characterized by the absence of pottery. It is followed by the Orange period in which fiber-tempered pottery first appears. The St. Johns period, the longest by far, is the most typical of the region. It is subdivided into a series of six sections under two main divisions, St. Johns I and II. The presence of an unclassified complex with bannerstones in this period is noted. St. Johns II is typified by the introduction of check-stamped pottery and lasts until about 1650. The St. Augustine period follows and comprises the remains of those forts, missions, and settlements in which Spanish and Indian mixed in varying degrees from 1650 until about 1730. This is the period to which Goggin has contributed so much in recent years. Almost nothing was known archaeologically about the Seminole period when this publication was printed. Since then Goggin's work has located a number of Seminole sites and this deficiency can be expected to be corrected.

The next section deals with Goggin's valuable concept of "traditions." "The term tradition refers to a distinct cultural complex which may in the course of time pass through some changes but not enough to alter the basic configuration." In other words they are the culture patterns present in the area under consideration. Goggin lists ten cultural traditions for the entire state: paleo-Indian, Archaic, St. Johns, Malabar, Gulf, Glades, Florida Mississippian, Alachua, Spanish-Indian, and Seminole. Of these only five are represented in the northern St. Johns: paleo-Indian, Archaic, St. Johns, Spanish-Indian, and Seminole. The temporal and spacial positions of all ten traditions for the Florida area are shown in a chart. Each of the traditions is discussed under the rubrics of: Definition, Distribution, Environmental Relations, and History. Under Definition he includes not only a summary of the salient traits but suggests probable origins and cultural relationships. The treatment of environment, while short, is the sort of thing so often omitted from archaeological reports. In a section entitled Historical Reconstruction, Goggin gives a brief summary of the cultural changes that have taken place on the St. Johns, and its relationships with other areas.

In appendix A are listed 432 archaeological sites classified according to the periods represented. Each site is identified by number, located approximately on the map, and identified with earlier site names. Published references and locations of the materials in various museums are very helpful. Goggin makes clear that this list is not to be taken as a final location of all sites in the area or a complete statement of the complexes present at any site. It certainly indicates what has been done and what remains to be done.

Appendix B describes the artifacts found. Although pottery is treated at great length, the nonceramic artifacts are by no means neglected. This section will be of little use in detailed comparison of traits or complexes but it does afford a valuable summary of the material available. Twelve plates give a brief, but adequate, representation of the traits examined. The bibliography seems to include all the archaeological publications and most of the pertinent historical references. It is remarkably free of errors.

Much of the material presented in this work is drawn either from survey or is abstracted from earlier reports. It is frankly not intended as the final word on St. Johns archaeology. The specialist who wants to make detailed comparisons will have to go to the original sources. It does give an excellent over-all picture of culture change in the area and indicates where more research should be done. The work is especially valuable in affording a modern correlation of the contributions of early excavators like Moore and Wyman. The increasing interest in the historical approach is reflected in the extensive information on the St. Augustine period. In his discussion of that period and of the Spanish-Indian tradition Goggin has contributed much to our knowledge

of the acculturation that went on during this important stage in Florida history. The influence of Spanish pottery styles on Indian types sheds new light on the conditions of Spanish settlement of the area.

The discussion of the paleo-Indian is largely inferential and obviously a great deal more work is needed. The time spans given for the paleo-Indian and Archaic traditions seem much too short in view of current dates for the rest of the eastern United States. The bulk of the information on the St. Johns period and tradition is derived from the excavation of small sand burial mounds by Moore and others. Little is known of the village site materials. It can be expected that such data will modify some of the temporal and spacial ideas at present current about this important period. Goggin's present work on the Seminole sites in central Florida will certainly expand what little is known about this late period.

It is often said that the time is not ripe for summaries of any specific area, but this report shows that such effort may be well worth while. We could wish equally auspicious beginnings for many other sections of the country.

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NOTES AND NEWS

EARLY MAN

The following report on the Los Angeles symposium on early man has been supplied by Homer Aschmann, University of California at Riverside. Bibliographic citations are to be credited to him. During the first week of January, 1954, the Assistant Editor for Early Man, accompanied by E. H. Sellards, Director of the Texas Memorial Museum, made a short trip to Southern California and was able to examine the collections mentioned by Aschmann (except Arnold's), and also to see some of the San Diego localities through the courtesy of George Carter. A distinct impression was formed that the term "artifact" is probably quite justified in some of these cases, where chipping scars are of such regularity that they can hardly be explained as accidental; but in other cases, "artifact" appears to be applied loosely to fractured rock where human agency is not at all necessary to account for the simple fracturing. Aschmann has not attempted to distinguish between valid and invalid applications of the term in his statement, which appears to be a very fair summary of the present status of this important problem. It is the opinion of the Assistant Editor that the presence of man in very remote times requires supporting evidence in the form of a concentration of the "artifacts" in definite camping areas, hearths or charcoal, remains of animals hunted or other food consumed, and the like, where tools were necessarily of the simplest nature.

Symposium on Early Man in Western North America

The advocates of a liberal time allotment for human occupation of the New World dominated the floor at a symposium on Early Man in Western North America which featured the fall meeting of the Southwestern Anthropological Association. The meeting was held at Los Angeles State College on November 21, 1953. The speakers were: Thomas Clements, Department of Geology, University of Southern California; Ruth D. Simpson, Southwest Museum; Brigham A. Arnold, Department of Geography, University of California at Berkeley; and George F. Carter, Johns Hopkins University, Baltimore.

Clements spoke on a locality in Death Valley where abundant heavily patinated artifacts lie embedded in the "desert pavement" on the Manly Terrace. Projectile points have not been found. The artifacts are believed to be more or less contemporary with the Manly Terrace, which is correlated with the Tioga (Mankato) ice advance of the late Pleistocene, or an earlier stage, but not later. Data on this discovery have been published (Clements and Clements, 1953).

Miss Simpson, on the basis of her examination and re-examination of numerous sites in the dry lake basins from the Mohave Desert to western Wyoming, concludes that there are two distinct phases to the early lithic record for the region: one includes projectile points and grinding tools, and the other, which on the basis of geologic associations is earlier, possesses only very simple tools and neither projectile points nor grinding implements. Reports on some of these sites have been published (Harrington, 1934; Renaud, 1938, 1940; Simpson, 1952; Clements and Clements, 1953). The pre-projectile point phase, because of the crudeness of the artifacts and the lack of well-defined campsites, has been generally neglected, but Miss Simpson feels that such a lithic pattern extended through many millennia and over a vast area. The almost invariable use of locally available rocks as raw material indicates that the typological uniformity is not to be explained by extensive trade.

Arnold dealt with a sequence of at least three distinct lithic traditions in the basin of Laguna Seca de Chapala in central Baja California. Each of these traditions occupied the area at a time when the climatic and topographic character of the basin differed from the present in major fashion. The artifacts from the oldest phase do not include projectile points and resemble those collected by Simpson and Clements; they are found only in the outer eastern margin of the basin, suggesting a time of much more humid climate when lakes virtually filled the basin area. Today, with an average annual rainfall of less than five inches, the two playas in this basin contain water only ephemerally. The artifacts of the middle phase include projectile points, and subsequent to it a sustained rise in the lakes flooded many of the sites. Arnold considers the repeated rise and fall of lake levels, with associated human occupations, to represent stadia of Wisconsin time, and feels he has evidence of mid- or early-Wisconsin occupation of the area.

Carter's work in the coastal areas of San Diego County is a continuation of his attempts to date occupation sites by a correlation of the valley terraces in and on which they are found with eustatic changes in sea level during the Pleistocene, and by the length of time required for the formation of existing soil horizons over the sites. A major premise of his work is that this part of San Diego County constitutes a stable portion of the earth's crust on which eustatic and pedologic processes can leave almost indelible marks. His belief that he has definite evidence of interglacial human occupation of the area has already been reported (Carter, 1952, and earlier papers cited therein). His current investigations, presented at the symposium, suggest second as well as third interglacial remains.

An opportunity was afforded for the display of artifacts. Simpson, Arnold, and Carter brought samples from their collections. While few of those present would accept all the rocks as definitely modified by human action, most if not all of them would accept some. Arnold's specimens were generally accepted. A part of the questioning of some specimens displayed by Simpson and Carter was due to their having deliberately selected their more dubious examples. If there is a culture of Pleistocene age in the New World, characterized by an absence of both stone projectile

points and grinding implements, such comparative examination of specimens must be carried on extensively to establish a useful typology for these utterly crude implements. Photographs of such crude tools are normally inadequate for analysis or even for acceptance as artifacts.

Naturally, conclusions as radical as those presented at the symposium did not go unchallenged from the floor, and as might be expected Carter's claims bore the brunt of the attack. George W. Brainerd and Clement W. Meighan of the Department of Sociology and Anthropology, University of California at Los Angeles, were particularly active in this discussion. A major question was whether Carter's figures for the time required for formation of particular soil horizons were minimal or maximal. A novel aspect was the fact that a discussion of mid-Wisconsin and even interglacial man in North America was receiving a hearing from such an interested audience. Another change in our ideas of the antiquity of man in America may be developing.

The existence of man in the New World as far back as interglacial times will never be demonstrated by a symposium on the subject. The demonstration which will satisfy a majority of students will be the discovery and analysis of one or more sites in terms of evidence of occupation correlated with unequivocal geologic and other evidences of age. This must be accompanied by field examination of the sites by several qualified observers. It is also essential that a maximum number of students be made aware of the possibilities of such correlations; and this can be done by symposia. It is improbable that one or even a few investigators will find those fortunate sites where human remains are associated with unmistakable evidence of great age; the chances increase as greater numbers of investigators have their eyes open to the possibilities. In the current enthusiasm for radiocarbon dating, our time perspectives should not be artificially limited to that one tool.

ARCTIC

Jorgen Meldgaard of the Danish National Museum is spending a year in the United States and Canada under a grant from the Arctic Institute of North America in cooperation with the University of Copenhagen. He is studying Arctic collections in connection with his Eskimo and Old Norse excavations in Greenland, and he plans to spend some weeks in the eastern Arctic during the open season.

Another visitor from Denmark is Count Eigil Knuth, leader of several large expeditions to Greenland. He is lecturing in North America and making comparative studies concerning his archaeological findings in Pearyland.

The combined archaeological project headed by Frederica de Laguna during the past few years will be continued this season under grants from the Penrose Fund of the American Philosophical Society and the Social Science Research Council. De Laguna, together with her mother Grace A. de Laguna, and Mary Jane Downs a fellow in Anthropology at Bryn Mawr College, left in February for Yakutat where they will be joined in June by Catharine McClellan.

Incomplete reports of two promising discoveries have reached this writer. From William Irving he learned that his father Dr. Laurence Irving, has discovered a rather extensive site in Howard Pass of the Brooks Range in northern Alaska. The site contains microblades, diagonally flaked implements, a burin, and other interesting artifacts, and appears to represent a camping place which has been occupied at several different periods.

The second report comes indirectly from Otto W. Geist, paleontologist at the University of Alaska. It seems that he has discovered a huge cave in the rugged country at the head of Porcupine River across the Alaskan boundary in the Yukon Territory of Canada. The cave has three chambers extending 600 feet into the mountain and, according to the news report, the remains of mammoths and other extinct animals are "strewn all over the area" in which the cave is located. Geist has hopes of finding human remains as well as those of extinct mammals in the cave.

PLAINS

The 11th Plains Conference for Archaeology was held November 26-28, 1953, in the quarters of the Department of Anthropology, University of Nebraska, and in the new Nebraska State Historical Society Museum at Lincoln. E. Mott Davis served as Chairman. William Mulloy was elected Chairman for the 12th Plains Conference. Field reports, formal papers, symposia, and round table discussions comprised the program. Fifty-eight persons registered for the conference.

Fewer field reports were on the program this year because of the severe curtailment of salvage archaeology resulting from cuts in the Federal budget. Robert L. Stephenson reported on the limited excavations carried on at the site of Tuttle Creek Dam in Kansas by Robert Cumming, the intensive survey of Fort Randall Reservoir by Harold Huscher, and a similar survey of Oahe Reservoir by Richard Wheeler. Reports of investigations of institutions working under cooperative agreements with the National Park Service in Oahe, Fort Randall, Garrison, and Medicine Creek reservoirs were given by Wesley R. Hurt, Carlyle S. Smith, Alan Woolworth, and E. Mott Davis. Davis reported on additional work at the Red Smoke site where it was established that the Frontier complex is earlier than Plainview. Other reports ranged geographically from Saskatchewan to New Mexico and temporally from early man to historic trading posts and military forts.

Major items on the conference agenda were a discussion of pottery typing, led by Jesse D. Jennings, and a symposium on current anthropological problems in the Great Plains, led by Wm. Duncan Strong.

The most significant contribution of the conference was the establishment of a taxonomic scheme covering

the principal culture complexes of the subareas known as the Central Plains and the Middle Missouri. The presentation was based upon discussions held informally in April 1953 among most of the individuals who have been concerned with recent work in the two regions. The scheme as originally constituted was modified through group discussion at a session led by Albert C. Spaulding. The Upper Republican and Nebraska aspects were grouped together as a long series of foci under the new Aksarben aspect. The Arzberger site and component D at the Talking Crow site were considered as manifestations of as yet unnamed foci of the Aksarben aspect and to represent a northward spread of a basically Central Plains culture. The Lower Loup and Hill foci, protohistoric and historic Pawnee manifestations, were grouped with the Fort Thompson focus to form the Pahuk aspect. The Stanley, Snake Butte, and other as yet unnamed foci, representing the protohistoric and historic Arikara, were grouped under the Sanish aspect. The La Roche and Bennett foci were assigned to the Chouteau aspect, a culture complex in existence just before the earliest trade with whites, antedating, at least in part, the Pahuk and Sanish aspects, and later than the Aksarben penetration. The term, Chamberlain aspect, was proposed to include the Over, Anderson, and Monroe foci which appear to antedate the Aksarben occupation in the Middle Missouri subarea. No modifications were proposed for other manifestations in the area such as the various Woodland complexes.

The terms used in the taxonomic framework change the tentative classification suggested by Smith at the 8th Plains Conference. Sanish aspect takes the place of "Grand River aspect"; Chouteau aspect takes the place of "La Roche aspect"; Chamberlain aspect takes the place of "Mill Creek aspect" (See Notes and News, AMERICAN ANTIQUITY, Vol. 16, No. 4, pp. 363-4). Copies of the taxonomic table and chronological chart may be obtained from Robert L. Stephenson, Missouri Basin Project, Burnett Hall, University of Nebraska, Lincoln, Nebraska.

Plans of the Smithsonian Institution for the 1954 field season depend entirely on the amount of money made available for salvage archaeology in next Federal budget. Under cooperative agreements with the National Park Service the University of South Dakota will have a field party in Oahe Reservoir, in charge of Hurt, and the State Historical Society of North Dakota in Garrison Reservoir, under Woolworth.

NORTHEAST

Excavation of the Sheguiandah site on Manitoulin Island was continued during July and August, 1953 by a National Museum of Canada party. Thomas E. Lee, who directed the excavations, reports the four cultural levels recognized last year have been more firmly established and a fifth, and older, level is now indicated. Numerous small charcoal samples were obtained. While trenching a small swamp hole on the hilltop, several artifacts were found in a clay layer under 18 inches of dense brown and black peat. Further digging here, it is hoped, will produce animal bones preserved by the peat.

The top level, thought to be a habitation area, is very thinly represented. To date no pottery has been recovered, but the site is believed to be Point Peninsula in age. The second layer has yielded several thousand artifacts which are most like Greenman's George Lake I materials in terms of sizes, shapes and chipping techniques. Below this, a thin layer yielded many types of projectile points, nearly all of which have very heavy basal and/or lateral smoothing. The fourth level produced finely chipped blades. The material from the fifth, and oldest, level may represent unfinished projectile forms.

One of the major problems of the site is the determination of the means whereby the artifacts of the fourth and fifth levels arrived in their present position. They are in a matrix of what appears to be fairly typical glacial till, resting upon deposits of lake bottom clays and gravels. Since they are on the rather small top of a quartzite outcrop and contain numerous boulders ranging up to hundreds of pounds in weight, such explanations as stream action and slippage seem inapplicable. The artifacts and matrix appear to have been tumbled into place. One geologist studying the site has expressed the opinion that this condition resulted from a local re-advance, or advances, of ice.

Elsewhere in Ontario, survey operations included the finding of some small Laurentian sites in the Ottawa Valley and burial mounds in Prince Edward County. Some minor excavations were carried out in the Bruce Peninsula where two burials were removed, both heavily sprinkled with red ocher.

Several sites were found in Quebec Province, particularly in the Tadoussac area.

The concluding project of the 1953 field research of the New York State Science Service was an excavation at Jamesport, on eastern Long Island, in October. Here a party consisting of William A. Ritchie, assisted by Irving Rouse of Yale Peabody Museum and Peter P. Pratt, University of Toronto, opened an undisturbed section of a large mortuary pit pertaining to the Orient focus of the early Woodland period. Two deposits of offerings were found, comprising "killed" steatite pots, projectile points, a gorget, grooved bannerstone, and other articles. One cache was imbedded in red ocher, the other was associated with a hearth which yielded a charcoal sample which it is hoped will provide the first date for the Orient culture.

Obviously the Orient shared a number of the basic traits of mortuary ceremonialism with the older Point Peninsula and other early Woodland manifestations.

In Western Long Island, Edward Patterson has been investigating an Archaic period site on Garvey's Point near Glen Cove, Nassau County.

NORTHERN MISSISSIPPI VALLEY

MINNESOTA. Excavation in two sites in Dakota County has been reported by Elden Johnson of The Science Museum, Saint Paul, Minnesota. Both sites were immediately adjacent to the Mississippi River. One find at the first site consisted of a partial vessel approximately eighteen inches in height, with a conoidal base and slightly constricted neck, which does not fit into any of the established Minnesota materials to date but may have affinities with the Effigy Mound materials of eastern Iowa. A rockshelter in the high limestone bluffs adjacent to the first dig was also excavated. This shelter yielded both shell tempered Oneota ware of the Orr focus and a variety of Woodland type wares, together with bone refuse and a good sample of worked lithic material. The site is nearly a duplicate of the Tudahl Rock Shelter dug by Wilford some years ago.

The 1953 field trip of the University of Minnesota, under the direction of Lloyd A. Wilford, was largely devoted to digging two burial sites, one at Yucatan, Minnesota, in the Root River Valley in the southeastern corner of the state, and one at Browns Valley, which is on the South Dakota border between Big Stone Lake and Lake Traverse. The Yucatan burials were typical Oneota burials of the Orr focus — 22 extended primary burials, often with rock slabs outlining the shallow pits or placed over the bodies, or both. Beads and copper ornaments accompanied some of the burials, and two small mortuary pots were found. Although Wilford has not yet had the material analyzed, he believes that some of the beads are of glass. If so, he feels the site can be dated as immediately prior to the year 1700.

The Browns Valley burials were in 25 pits in a gravel deposit. Burials were both secondary and primary. The principal grave goods were shell ornaments, though two small conoidal-based mortuary vessels were present. Some pits contained primary burials, one or more to a pit, but the skulls and arm bones were usually missing. The other pits contained multiple secondary burials, represented by skulls and arm bones and seldom any other bones. The artifacts were with the secondary burials. The manifestation is ascribed to the Red River aspect of the Woodland, though these are the first burials of the aspect not found under mounds.

At Browns Valley, a habitation site three miles north of the burial site was studied. The pottery was Woodland, but laboratory analysis has not yet been made. Also three habitation sites on Jensen's Island in Lake Traverse were tested. Two proved to be of 19th century Sioux provenience, the third yielded Woodland pottery types. The island is being eroded away since the construction of dams at both ends of the lake, and a group of skeletons was washed out last spring. A study of the portions of skeletons still remaining proved them to be 19th century Sioux.

MISSOURI. Carl H. Chapman of the University of Missouri, reports that salvage operations at Graham cave conducted in conjunction with the Missouri Archaeological Society continued during the past fall. Plans are now being developed to form a state park of the cave and about 200 acres of surrounding land. The University has just completed the negotiation of another contract with Region Three of the National Park Service for a cooperative archaeological salvage project in the Table Rock Reservoir area for next year. Surveys will be conducted in the area this next spring and the University Summer Field Session in Mid-Western Archaeology will be held in the area from June to August next summer.

OHIO. Raymond S. Baby of the Ohio State Museum reports that during the month of November, 1953, salvage excavations were carried on in a large Adena type mound in Columbus. Salvage explorations were also made early in December on a site in northern Ohio being destroyed by construction of the Ohio Turnpike.

WISCONSIN. A radiocarbon date for the Old Copper culture of Wisconsin has been announced as the result of the analysis of a charcoal specimen by the Institute for Nuclear Studies at the University of Chicago. The date, 5,600 years ago plus or minus 400 years, is for the Oconto site described by Robert E. Ritzenthaler and Warren L. Wittry in Vol. 33, No. 4 of *The Wisconsin Archeologist*.

SOUTHEAST

GEORGIA. During the fall of 1953, Lewis H. Larson, working for the Georgia Historical Commission, continued exploration of shell midden areas at Pine Harbor site, near Darien, McIntosh County, Georgia. This work will continue into the winter months. Larson is excavating a village midden of a protohistoric horizon of "coastal Lamar," ceramically and chronologically representative of the pre-contact levels just before the advent of the 16th century Spanish missions. He is finding good assemblages with a surprising occurrence of pottery effigy forms and symbolic decorations pertaining to a late peripheral survival of the "Southern cult," including a localized variant of the Eagle Warrior.

Sheila K. Caldwell has completed excavations at the Darien bluff site, tentatively identified as Santo Domingo de Talaxi, and is engaged in writing a report for the Georgia Historical Commission.

At the University of Georgia W. H. Sears is completing his final report on four seasons of exploration at Kolomoki Mounds. A. R. Kelly is working on Georgia mid-coastal Archaic, the Mulberry Plantation site at Camden, South Carolina, and the historic horizon in the Flint-Chattahoochee "forks" area.

C. H. Fairbanks, National Park Service, dug at the 9HL64 site in Hall County, Buford Reservoir, previously reported by Caldwell, Thompson, and Caldwell. The site proved to be a natural levee inhabited by Indians during deposition and later eroded to leave a mound-like remnant. The analysis of the collections is going on. The pottery seems to be check-stamped with some simple-stamped at the top. Points are rather small

triangular affairs. One straight line of postholes may indicate rectangular houses on the check-stamped level.

FLORIDA. Two University of Florida field projects were carried out during the summer. Paul Hahn, now a graduate student at Yale University, supervised the third season of excavation at the Fountain of Youth Park. Extensive structural evidences were found and a new area of historic burials was opened up near those now on exhibit.

Early in the summer an archaeological survey of western Charlotte and adjacent Sarasota County was initiated under the sponsorship of Mr. and Mrs. W. H. Vanderbilt. This work under the over-all supervision of John M. Goggin began in June. Later during the summer it was continued by William Plowden and other University of Florida students. The survey, carried out by jeep, boat, and airplane, revealed 71 archaeological sites.

This fall the first excavations in this program were made by Goggin and students at Angers Boat Basin at Englewood. Here in a 4½ foot deep shell mound an excellent stratigraphic picture was obtained with fibre-tempered pottery (below tide level) underlying deposits characterized by Glades Plain. This is the most southerly site with fibre-tempered pottery that has been excavated.

ALABAMA. Archaeological activities will be resumed in this state with the recent appointment of David L. deJarnette as archaeologist-in-charge of Moundville State Monument. He has a contract with the Alabama Museum of Natural History, University, Alabama, to operate Mound State Monument on a long-term lease. He will have charge of the archaeological and recreational features of the Park, including the Museum, and will also furnish curatorial services for the collections and supervise excavations. It is hoped that time will permit preparation of short studies and papers on the Moundville site. All of the material from the Alabama Museum's extensive excavations in Alabama, including the Tennessee Valley, is now stored in the Monument's archaeological laboratory. Laboratory space and limited quarters can be furnished students who are interested in making studies of this material.

TENNESSEE. T. M. N. Lewis and Madeline Kneberg, University of Tennessee, spent a large part of the summer serving as consultants for the Cherokee Historical Association at Cherokee, North Carolina in connection with two of the Association's projects, the Museum of the Cherokee Indian, and Oconaluftee Village, a reconstruction of a 19th Century Cherokee town. Also, seven weeks of lectures on Cherokee ethnology were given for reservation personnel and others, under the sponsorship of the Cherokee Historical Association. These activities are part of the Association's program to perpetuate the history and traditions of the Cherokee Indians and to improve the general economic and social conditions on the reservation. An interesting part of the work was the reviving of almost forgotten crafts in pottery, bone, stone, etc.

KENTUCKY. Raymond H. Thompson, under the auspices of the University of Kentucky Research Fund Committee, has begun a technological study of pottery collections from the Ohio Valley area. The first phase of this project will emphasize petrographic techniques and the use of the binocular microscope.

PACIFIC COAST

William J. Wallace and a group of students from the University of Southern California continued their archaeological survey of Death Valley National Monument during the Thanksgiving holiday. An additional 50 sites were located and mapped. Forty-seven were campsites of the recent Indians, the others were rock alignments. The campsites, located in an area not visited by relic-hunters, were rich in artifacts. Included in the surface collections were several nearly complete pots and a large wooden mortar. Wallace also reports preliminary excavations at a large village site in Vermilion Valley, Fresno County. Donald W. Lathrop and Jack Nicoll partially excavated a large house pit, recovering nearly 300 artifacts. Complete excavation of the site is planned for early June.

At the University of Utah, the Department of Anthropology is continuing its current research projects. Jesse D. Jennings is reworking the materials from Danger cave, Wendover, Utah, in order to include new materials recovered during the 1953 excavations. The new material appears to validate previous interpretations.

Jack R Rudy has completed a short report on the excavation of an overhang site west of Enterprise, Utah. The overhang had been occupied by both Puebloid groups and southern Paiute. The southern Paiute materials were found stratigraphically above the Puebloid materials. Rudy is now working on a report of the Beef Basin (southeastern Utah) excavations carried out last summer.

Luther Cressman of the University of Oregon is continuing work on the analysis of the collection obtained last summer at site 35WS8 in The Dalles Reservoir area. Approximately 3,800 artifacts were recovered from this significant site. Two students from the University of Oregon spent the Christmas vacation at the site, continuing the excavations into an artifact-bearing stratum of hardpan. A contract between the National Park Service and the University of Oregon will make possible continued excavations in The Dalles Reservoir area in the summer of 1954.

Materials from the large rockshelter near Vantage on the Columbia River, excavated by a University of Washington crew under the field direction of Earl Swanson, are in process of analysis. Quantities of perishable artifacts were recovered from the deeply stratified deposits. Plans have been made to return to the area to expand the range of the work, and to follow up preliminary testing of an early midden site.

Warren Caldwell, graduate student at the University of Washington, is planning to continue excavations at

the Wakemap mound in The Dalles Reservoir area during the summer of 1954. This work is being carried on under a contract between the National Park Service and the University of Washington.

Charles E. Borden of the University of British Columbia indicates that plans for the coming summer call for surveys of the Vanderhoof area in central British Columbia and in the Kootenay district in the southeast corner of the province. He also intends to start excavations in the oldest habitation area in the Musqueam Reserve, Vancouver, B.C. Borden reports that surface finds from the old area suggest strong affinities with the Marpole complex, and contrast sharply with material excavated from recent village deposits on the reserve.

Richard D. Daugherty of the State College of Washington has received a radiocarbon date for the cultural materials from the Lind Coulee site in central Washington. Tests on burned bison bone found in direct association with artifacts give the following dates: 9400±940, 8516±460, for a weighted average of 8700 ±400 years. The tests were run by W. F. Libby, and the material bears his sample number 827.

M. R. Harrington of the Southwest Museum reports that Ruth D. Simpson, Assistant Curator, recently completed a survey trip involving visits to a number of early man sites in the western United States. Harrington has been devoting considerable time to working on his report of the excavations near Little Lake, Inyo County, California, which he expects to complete in 1954.

SOUTHWEST

Arizona. Walter W. Taylor, Santa Fe, New Mexico, made a brief reconnaissance of the Colorado River from Lees Ferry to Pierce Ferry (Lake Mead) by boat through Marble Canyon, Grand Canyon, and the Granite Gorges. Occupational evidence was scarce.

Terah L. Smiley of the Laboratory of Tree-Ring Research reports that approximately 5,000 specimens have been received from archaeological excavations and survey work of the last summer in the Southwest. A tree-ring exhibit for the Heard Museum, Phoenix, Arizona, is in preparation. A bulletin on all the tree-ring dates to April 1, 1953, for the Northern Rio Grande area, is in press.

H. Thomas Cain, Heard Museum, Phoenix, has been rearranging the Southwest archaeological exhibits. Three rooms have been reinstalled, Hohokam Prehistory, Anasazi, and modern Pueblo culture. The Museum is sponsoring a weekly TV program, "Mystery of Man" (KPHO:5).

Odd Halseth, Pueblo Grande, Phoenix, Arizona, reports that Donald H. Hiser has joined the staff. Additional excavations will be started at Pueblo Grande. The Hohokam site of La Cuidad has been leveled during excavations for a new hospital.

Charlie Di Peso, Amerind Foundation, Dragoon, has begun work on a site (Paloparado) 14 miles north of Nogales. It is hoped that the sites worked can be coordinated to bring together knowledge of the various historic Indian groups of southeastern Arizona and help to link the historic and the prehistoric periods. Barton Wright is field assistant.

John C. McGregor, University of Illinois, excavated a site on the Pollock Ranch (NA 4317) 40 miles southeast of Flagstaff during the summer. Seven rooms of a pueblo were excavated, four partially excavated, and a trench was dug in the trash. A total of 26,000 sherds were studied and classified. Only a small percentage were decorated. The Pollock site is late Pueblo III and early Pueblo IV. Except for Kinnikinnick, it is the latest Sinagua site dug. Three burials with offerings were found in the trash. One room excavated showed a number of features which indicate possible use as a kiva. It is the first such room found in a Sinagua ruin.

Harold S. Colton, Museum of Northern Arizona, is continuing work on the Ceramic Series of the Museum publications. The new 12,000-square foot Research Center of the Museum of Northern Arizona was completed in October, 1953, and collections will be moved from the present storage areas to the new building.

Fred Wendorf and Franklin Fenanga have been surveying for the El Paso Natural Gas Company on a parallel pipeline on the right-of-way across Arizona. A number of pit houses were excavated during October, one just east of Flagstaff. Other work on the pipeline right-of-way is being done in New Mexico. Jesse L. Nusbaum, National Park Service, has been in charge of arrangements for this work.

New Mexico. Erik K. Reed reports National Park Service projects as including excavation of a circular structure of the Mesa Verde period at Aztec Ruins, New Mexico. There was a kiva surrounded by two concentric rows of encircling rooms. This work was done by T. B. Onstott. A third and final season's work was devoted to Kin Kletso (Yellow House) in Chaco Canyon by R. Gordon Vivian.

A. H. Schroeder, National Park Service, has been working on a special study of Yavapai history for the Justice Department.

The staff of the Austin, Texas, office of the River Basin Surveys have made a few preliminary surveys of proposed reservoir areas in Texas and Kansas and have continued laboratory work and the preparation of reports. No other field work or new research is planned by the Park Service for the winter or spring of 1954 because of cuts in appropriations.

Stanley Stubbs, Laboratory of Anthropology, Santa Fe, assisted by Gary Vescelius, conducted archaeological excavations in the Tesuque Valley just east of Cuyamungue, north of Santa Fe. The site consisted of 12 to 15 small house units, each of ten to 20 rooms and associated kivas. Kivas were both circular and rectangular. A great kiva 52′ in diameter was partly excavated. In part the floor was almost 9′ below the present surface. The general pattern is PI-PII of northwest New Mexico. Tentative dating based on field examination of the pottery is in the 1000's, perhaps as late as 1150 in part. This may be revised on further study of artifacts and tree-ring material. This site provided many new data

on upper Rio Grande archaeology and changes some ideas on the concepts of cultural development in the area and the time of introduction of certain traits.

COLORADO. Joe Ben Wheat, University of Colorado Museum, Boulder, reports that H. W. Dick excavated a stratified Cody Complex site near Yuma, Washington County, eastern Colorado. Hugo G. Rodeck is preparing an extensive report on Mimbres pottery with zoomorphic designs. Robert H. Lister was on a reconnaissance in northwestern Chihuahua and eastern Sonora from June 22 to July 8, and from July 23 to August 25 he conducted a field school in Mesa Verde. A small pueblo site in the Far View group on Chapin Mesa was excavated. Two deep circular kivas, a tower, and 12 surface rooms were excavated. The two kivas and the tower were connected by a tunnel. Eight human burials and several dog burials were found. The pueblo ceramically dates in the late 1100's or early 1200's. Gordon W. Hewes, of the University of Colorado, and Fred Rosentiel, Columbia University, conducted a surface survey of sites in the Pine River Valley, La Plata County, Colorado.

H. W. Dick joined the faculty of Trinidad Junior College, Trinidad, Colorado, and is in charge of the museum.

Carroll L. Riley is taking Robert Lister's place at the University of Colorado while Lister is on leave in Mexico under a Ford fellowship.

SOUTH AMERICA

BRAZIL. Helen C. Palmatary spent some ten weeks in August-October, 1953, studying museum collections in Brazil as part of a project of research on the antiquities of the Tapajós and Trombetas rivers (lower Amazon). This work is a continuation of her classic study of Tapajó pottery published in 1939. She reports abundant materials at Belém, Santarém, Belterra, Recife, Rio de Janeiro and São Paulo. Stone objects are numerous in the area studied as contrasted with Marajó at the mouth of the Amazon and there is considerable local variation in the pottery.

At Belém, the Goeldi Collection contains few but choice specimens from Santarém and the upper Tapajós, including some anthropomorphic vessels different from anything found in other collections. There is also some interesting miniature pottery. Frederico Barata has a large collection including very fine Tapajó style pieces, miniature pots, pipes, amulets, and several unusual figurines.

At Santarém, Carlos Liebold has a fine Tapajó collection including two unusual zoomorphic bottles. At Belterra, C. H. Townsend, Jr., has important material from Santarém, the plateau of Belterra, and the upper Tapajós. His collection includes non-Tapajó style pieces, but some of them are clearly related to classic Tapajó.

At Recife, Miss Palmatary found a fine onça jar in the Oliveira Collection at the Museu do Estado and studied muirikitãs (nephrite amulets) in the collection of the late Carlos Estevão de Oliveira, who had one of the most valuable collections of these objects in Brazil.

At Rio de Janeiro, the Museu Nacional has a small Tapajó collection and one from the Trombetas, the latter all sherd material and containing a high proportion of Tapajó style pieces, probably trade items. The Fundação Brasil Central has the important Brown Collection of Tapajó material. At São Paulo, the Museu Paulista has recently acquired a substantial Tapajó collection including interesting figurines.

Miss Palmatary also reports that Peter Paul Hilbert of the Museu Paraense Emilio Goeldi at Belém has prepared a report on his archaeological work in 41 mounds on the Trombetas River, which is to be published by the Sociedade de Antropologia do Pará. He plans to continue his researches in lower Amazon archaeology.

The Ohio Valley Historic Indian Conference, a group of historians, archaeologists, linguists, anthropologists, and ethnologists, held its first annual meeting at the Ohio State Museum, Columbus, Ohio, November 19-21, 1953. Its purpose was to secure the cooperation of the various disciplines of scholarship interested in the study of the historic Indian of the Ohio Valley region. In attendance were representatives from the states of the Ohio Valley, New York, and Washington, D.C.

Presiding at the formal sessions was John W. Bennett, Ohio State University. Papers were presented by: Erminie Voegelin, Indiana University; Glenn L. Black, Indiana University; and Dwight L. Smith, Miami University. At the banquet, John Corbett, archaeologist of the National Park Service, introduced William S. Webb, University of Kentucky, as the speaker.

At the business meeting, the Conference was formally organized and the following officers elected: Erminie Voegelin, Indiana University, chairman; Richard C. Knopf, Anthony Wayne Parkway Board of Ohio, Executive Secretary; Executive Committee: Raymond S. Baby, Ohio State Archaeological and Historical Society; August C. Mahr, Ohio State University; Dwight L. Smith, Miami University; William S. Webb, University of Kentucky; and John Witthoft, Pennsylvania Historical Commission. A journal of the Conference, *Ethnohistory*, will be published. The first issue is scheduled for January, 1954; the second for May, 1954. Correspondence should be directed to the Executive Secretary, The Ohio State Museum, Columbus, Ohio.

XXXI INTERNATIONAL CONGRESS OF AMERICANISTS

The 1954 meetings of the Congress are August 23 through 28, at São Paulo, Brazil. Several excursions are planned. Subscriptions for membership ($10.00 for full members; $5.00 for associates) are payable to Professor A. R. Müller, Escola de Sociologia e Poltica de S. Paulo, Largo de S. Francisco 19, São Paulo, Brazil. Professor Müller should also be notified of proffered papers before the end of May, 1954.

1953 VIKING FUND MEDALS AND AWARDS

FOR OUTSTANDING ACHIEVEMENT IN THE FIELD OF ANTHROPOLOGY

MEDALIST IN ARCHAEOLOGY

CHOSEN BY

THE SOCIETY FOR AMERICAN ARCHAEOLOGY

DR. GORDON R. WILLEY

MEDALIST IN GENERAL ANTHROPOLOGY

CHOSEN BY

AMERICAN ANTHROPOLOGICAL ASSOCIATION

DR. MELVILLE J. HERSKOVITS

MEDALIST IN PHYSICAL ANTHROPOLOGY

CHOSEN BY

AMERICAN ASSOCIATION OF PHYSICAL ANTHROPOLOGISTS

DR. T. DALE STEWART

PREVIOUS VIKING FUND MEDALISTS

1946

DR. ALFRED V. KIDDER
DR. ALFRED L. KROEBER
DR. FRANZ WEIDENREICH

1947

DR. JOHN O. BREW
DR. EARNEST A. HOOTON
DR. ROBERT H. LOWIE

1948

MR. ALEX D. KRIEGER
DR. ADOLPH H. SCHULTZ
DR. JOHN R. SWANTON

1949

DR. WILLIAM K. GREGORY
DR. HALLAM L. MOVIUS, JR.
DR. GEORGE P. MURDOCK

1950

DR. EMIL W. HAURY
DR. CLYDE K. KLUCKHOHN
DR. WILTON M. KROGMAN

1951

DR. CARLETON STEVENS COON
DR. RALPH LINTON
DR. FRANK H. H. ROBERTS, JR.

1952

DR. ALFONSO CASO
DR. JULIAN H. STEWARD
DR. WILLIAM L. STRAUS, JR.

EARL H. MORRIS

Kidder Award Medalist, 1953 *

As one of the very few scholars in the field of American archaeology who has contributed to both Southwestern and Meso-American study, Dr. Earl H. Morris, of the Carnegie Institution of Washington, is selected as the Kidder Award Medalist for 1953.

Specifically, his contributions toward the analysis and understanding of the Anasazi Pueblo culture sequences, his laborious and informative excavations in recent years in Basketmaker sites near Durango, Colorado, his earlier excavation of Aztec Ruin and his reconstruction of the Great Kiva there, and his monumental work on the La Plata district of Colorado, comprise the highlights of his Southwestern work. His contributions in Meso-America are memorialized in his brilliant excavation and repair of the Temple of the Warriors at Chichen-Itza. He is regarded as a skilled and ingenious field man and director of excavation. He has contributed heavily and directly toward an orderly interpretation of culture sequences in the entire Southwest. Throughout his entire career, generous assistance to all students has characterized his work and has led to the annual widening of his circle of friends.

* Awarded every third year. See *American Antiquity*, Vol. 16, No. 3, p. 267.

DR. GORDON RANDOLPH WILLEY

Peabody Museum of Archaeology and Ethnology, Harvard University Cambridge, Massachusetts

Nominated by The Society for American Archaeology to receive the 1953 Viking Fund Medal and Award in Archaeology

As one of the most productive and influential archaeologists working in the American field, Dr. Gordon Willey is held in the highest regard by his colleagues. He is being honored for his extensive field researches and his many publications in three of the major New World areas, the Southeastern United States, Middle America and Peru. His writings have been notable for their thoughtful analyses of major problems and for their advances in methods and interpretations. A recent outstanding example of this is his *Prehistoric Settlement Patterns in the Virú Valley, Peru* in which he has developed a new approach toward a functional interpretation of archaeological cultures. Other highly significant publications have been his pioneering attempt with Ford to synthesize the history of the Southeastern area, his many contributions to the *Handbook of South American Indians*, his *Archaeology of the Florida Gulf Coast*, and his searching critique of the Chavin problem. Also indicative of his status as one of the outstanding contributors to the science of American archaeology is his masterly analysis of New World archaeological theory in *Anthropology Today*.

SOME RECENT PUBLICATIONS *

The following abbreviations are used in the references which follow:

A	*Antiquity*. Newbury, Berkshire, England.
AA	*American Anthropologist*, n.s. Menasha.
AHG	*Antropología e Historia de Guatemala*. Guatemala.
AMNH-AP	*American Museum of Natural History, Anthropological Papers*. New York.
APS-P	*American Philosophical Society, Proceedings*. Philadelphia.
Ar	*Archaeology*. Cambridge.
ASNJ-B	*Archeological Society of New Jersey, Bulletin*. Trenton.
ASV-QB	*Archeological Society of Virginia, Quarterly Bulletin*. Staunton.
BAE-B	*Bureau of American Ethnology, Bulletin*. Washington.
BBAA	*Boletín Bibliográfico de Antropología Americana*. Mexico.
CA	*Cuadernos Americanos*. Mexico.
CGJ	*Canadian Geographical Journal*. Ottawa.
CIW-CAAH	*Carnegie Institution of Washington, Contributions to American Anthropology and History*. Washington.
CIW-CR	*Carnegie Institution of Washington, Department of Archaeology, Current Reports*. Washington.
CIW-NMAAE	*Carnegie Institution of Washington, Notes on Middle American Archaeology and Ethnology*. Washington.
CIW-P	*Carnegie Institution of Washington, Publications*. Washington.
CM-AN	*Carnegie Museum, Archeological Newsletter*. Pittsburgh.
CNHM-B	*Chicago Natural History Museum, Bulletin*. Chicago.
E	*Ethnos*. Stockholm.
EP	*El Palacio*. Santa Fe.
ESAF-B	*Eastern States Archaeological Federation, Bulletin*. Trenton.
FIA	*Florida Anthropologist*. Gainesville.
IAS-J	*Iowa Archeological Society, Journal*. McGregor.
INAH-A	*Instituto Nacional de Antropología y Historia, Anales*. Mexico.
ISAS-J	*Illinois State Archaeological Society, Journal*, n.s. Springfield.
M	*Man*. London.
Mas	*Masterkey*. Los Angeles.
MAS-B	*Massachusetts Archaeological Society, Bulletin*. Attleboro.
MoA	*Missouri Archaeologist*. Columbia.
MS	*Museum Service*. Rochester.
NH	*Natural History*. New York.
NMC-B	*National Museum of Canada, Bulletin*. Ottawa.
NMM	*New Mexico Magazine*. Santa Fe.
NYAS-T	*New York Academy of Sciences, Transactions*, Series 2. New York.
OA	*Ohio Archaeologist*, n.s. Dayton.
OAS-B	*Oklahoma Anthropological Society, Bulletin*. Norman.
OAS-NL	*Oklahoma Anthropological Society, Newsletter*. Norman.
OSAHQ	*Ohio State Archaeological and Historical Quarterly*. Columbus.
P	*Plateau*. Flagstaff.
PA	*Pennsylvania Archaeologist*. Honesdale.
PAC-NL	*Plains Archaeological Conference, News Letter*. Lincoln.
PMAAE-P	*Peabody Museum of American Archaeology and Ethnology, Papers*. Cambridge.
RAE	*Revista de Arqueología y Etnología*, 2. época. Havana.
S	*Science*. Washington.
SA	*Scientific American*. New York.
SAC-NL	*Southeastern Archeological Conference, Newsletter*. Baton Rouge.
SAP-J	*Société des Américanistes de Paris, Journal*, n.s. Paris.
SJA	*Southwestern Journal of Anthropology*. Albuquerque.
SL	*Southwestern Lore*. Boulder, Colo.
SM	*Scientific Monthly*. Washington.
SMC	*Smithsonian Institution, Miscellaneous Collections*. Washington.
T	*Tlatoani*. Mexico.
TI	*Tlalocan*. Mexico.
TA	*Tennessee Archaeologist*. Knoxville.
TAS-B	*Texas Archeological Society, Bulletin*. Austin.
TRB	*Tree Ring Bulletin*. Tucson.
UCAS-R	*University of California Archaeological Survey, Report*. Berkeley.
UC-PAAE	*University of California, Publications in American Archaeology and Ethnology*. Berkeley.
UK-RA	*University of Kentucky, Reports on Anthropology*. Lexington.
UM-ASP	*University of Montana, Anthropology and Sociology Papers*. Missoula.
USD-MN	*University of South Dakota, Museum News*. Vermillion.
UU-AP	*University of Utah, Anthropological Papers*. Salt Lake City.
VFPA	*Viking Fund Publications in Anthropology*. New York.
WA	*Wisconsin Archaeologist*. Milwaukee.
YU-PA	*Yale University, Publications in Anthropology*. New Haven.
ZE	*Zeitschrift für Ethnologie*. Braunschweig.

* EDITOR'S NOTE:

Over 565 titles are included in this feature this year. The search for titles is done entirely by the ASSISTANT EDITORS. The coding, arranging and editing, from cards supplied by the EDITORS, have been done by Mrs. Norma B. Mikkelsen, Library Assistant, University of Utah.

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